IDENTIFYING BARRIERS TO KNOWLEDGE MANAGEMENT

IN THE UNITED STATES MILITARY

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VITA

Summer Elaine (Scott) Bartczak was born November 1, 1963, in North Little Rock, Arkansas. She graduated from Ole Main High School as valedictorian in 1982. She accepted an appointment to the U.S. Air Force Academy, and, after completing her undergraduate education, was commissioned a second lieutenant in May 1986. After a short stint in undergraduate pilot training, she entered the Administration, then Information Management and Communications-Computer career fields and has served in a variety of positions at Air Forces bases both stateside and overseas. In 1990 she received a Master of Science degree in Information Resource Management from the Air Force Institute of Technology, and in 1999 she received a Master of Military Operational Art and Science degree from the U.S. Air Force's Air University, Air Command and Staff College. After completing Air Command and Staff College, she was selected for participation in an Air Force-sponsored doctoral program in Management Information Systems. As such, she entered the Auburn University Graduate School in September 1999. She married and has three lovely daughters.

DISSERTATION ABSTRACT

IDENTIFYING BARRIERS TO KNOWLEDGE MANAGEMENT

IN THE UNITED STATES MILITARY

Summer E. Bartczak

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The purpose of this dissertation is the identification of influence factors that act as barriers to implementing knowledge management (KM) in U.S. military organizations. The dissertation addressed four research questions: 1) What are the managerial influences that act as barriers to the implementation of KM programs in the U.S. military? 2) What are the resource influences that act as barriers to the implementation of KM programs in the U.S. military? 3) What are the managerial influences that act as barriers to the implementation of KM programs in the U.S. military? 4) How do managerial, resource, and environmental influences impact KM program implementation in U.S. military organizations?

The investigation was conducted using case study methodology. Six military organizations were studied and analyzed. A plethora of negative influences were

identified and three influence "process" models—a managerial, resource, and composite

model—are proposed. The key negative influences include: lack of leadership

education/commitment; functional stovepipe approaches to funding/ problem-solving;

lack of resources, especially funding; negative impacts of service-level IT plans, and the

inability to prove value to customers and leaders.

In developing the composite model of negative KM influences, the research noted

that organizations have, in many cases, confused the need for KM and the greater desire

for organization learning through effective transfer systems. Knowledge transfer (KT)—

a higher-order concept than KM--requires knowledge capture (KC), knowledge

management (KM), and knowledge distribution through information technology (IT).

These subsystems require separate approaches and technologies which must be

effectively integrated to achieve the KT necessary for learning organizations. With this

in mind, the composite model of influences presents the "vicious circle" of negative

influences. It describes the chain of negative influences that begin with the inability to

concisely communicate/describe KM/KT, which leads to weak leadership support, lack of

resources, inadequate systems, user dissatisfaction, and the inability to prove value. The

practical application of this research for the U.S. military is that identification of the

negative influences and the "vicious circle" is a first step in creating positive influences

and a "virtuous circle" that allow the services to achieve knowledge transfer in support of

their stated goals of knowledge superiority and the transformation to learning

organizations.

ACKNOWLEDGEMENTS

The author would to express sincere appreciation to all the individuals who made the completion of this dissertation possible. Initial thanks go to the members of my dissertation committee: Dr. William Boulton, Dr. Sharon Oswald, and Dr. Kelly Rainer. Without Dr. Boulton, this project simply would not have materialized. His "vision of the world" propelled me to the research, and his motivation and "ultra" quick responses helped to transition the ideas into substance. Thanks also go to Dr. Kelly Rainer and Dr. Sharon Oswald for supporting this effort in every manner possible.

Aside from professional gratitude, I owe a great debt and a world of thanks to all my family members and friends who helped me through this process. There are no words to express my appreciation to my mother for all the times she "bailed me out" and to my father who convinced me I could do anything so many years ago. Close friend, Dr. Mike Morris, also deserves a special thanks for getting me into this program and also for his humorous support along the way. Appreciation also goes to my extended circle of friends (especially Martha Kiel) who were constantly "in touch" and provided me much motivation and encouragement. Final thanks go to my dear husband and three little daughters who endured this process with smiles on their faces. From their joking reminders to "get back in my hole" (their fond nickname for my office) to taking over all my motherly responsibilities, they supported me every step of the way.

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CHAPTER ONE—INTRODUCTION

"Drowning in information, but starved for knowledge" (Naisbitt, 1984, p. 17) is the plight of many of today's public and private sector organizations. Being a very large (Nissen, 2001) public sector organization, the military is no exception. As society has transitioned from the Industrial Age to the Knowledge Age, the evolution of computing technology has changed the landscape of the modern world and workplace. Unprecedented advances in information technology have allowed organizations to increase productivity, reduce cycle times, and expand operations. Simultaneously, however, this same technology has contributed to a proliferation of information--an information glut--that threatens to overwhelm, instead of help, its human users. What has resulted is an increasing awareness that it is "knowledge" and not "information" or "data" that is key to future organization success and innovation (Amidon, 1997). This "knowledge", defined by some as "the most valuable form of content in a continuum starting at data, encompassing information, and ending at knowledge" (Grover and Davenport, 2001, p. 6) has become the "holy grail" for many of today's organizations including the U.S. military. Where the focus in the past has been on land, machines, or capital, knowledge is now being recognized as perhaps the most strategically significant organization resource (Earl, 2001, p. 215; Nidumolu, 2001, p.116; Zack, 1999, p. x).

According to Becerra-Fernandez:

> The widely held belief that the richest resource of today's organizations is the
> knowledge residing individually and collectively among employees reflects the
> importance of processes for promoting the creation, sharing, and leveraging of
> knowledge. (2001, p.24)

This focus on knowledge and knowledge processes has led to the evolution the concept and practice of knowledge management (KM). Knowledge management is hard to define. There are numerous definitions, but what is critical to understand is that the purpose of KM is to "enhance organizational performance by explicitly designing and implementing tools, processes, systems, structures, and cultures to improve the creation, sharing, and use of…knowledge that [is] critical for decision-making" (Delong and Fahey, 2000, para 14). Although KM has been seen by many as just another management "fad", the practice is gaining a strong foothold in many industries. According to Davenport and Grover, what began

> "first in industries and functions that [were] basically selling knowledge--
> professional services, pharmaceuticals, research and development functions…is
> quickly moving into other industries, including manufacturing, financial services,
> and even government and military organizations." (2001, p. 4)

In the words of Davenport and Grover,

> "…[KM] must become the basic fabric of successful businesses. There are far too
> many knowledge workers dealing with too much knowledge for knowledge
> management to disappear. …It can be expected that at some point every industry

will view itself as knowledge-intensive and will adopt knowledge management approaches in virtually every business unit and function" (2001. p. 4).

<div style="text-align: center;">Military Interest in Knowledge Management</div>

The military faces many of the same challenges as the private sector in dealing with realities of the Information Age. Specifically, Joint Vision 2020 and service doctrines all tout the concept of "information superiority" and "knowledge superiority" as critical core competencies necessary for fighting wars in the future (Joint Chiefs of Staff, 2000; Office of the Assistant Secretary of Defense for Command, Control, Communications, and Intelligence (OASD/C3I), 2000a). The primary focus of the military, however, centers around developing new strategies that allow it to maintain a dominant military position in spite of funding constraints (Owens, 2001). Although tragic events, such as the World Trade Center and Pentagon destruction, and the accompanying realization of a serious homeland terrorist threat, may precipitate near-term relief from military cuts, the future role of our military force remains uncertain. While funding may become a non-issue in the short term, the military requirements for fighting terrorism are likely to require a major transformation, relying heavily on Information Age technologies for future missions.

In military circles, the terms "revolution in business affairs" (RBA) and "revolution in military affairs" (RMA) describe the two significant spheres of change being experienced by the military as a result of the Information Age (Johns, Shalak, Luoma, and Fore, 2000; OASD/C3I, 2000b). RBA represents the changes concentrated in the commercial sector, which are also significantly affecting military business processes,

such as e-commerce, business process improvement, and re-engineering (OASD/C3I, 2000b). RMA, however, centers on the "use [of] new technology to transform the way in which military units can wage war" (Owens, p. 10; OASD/C3I, 2000b). Both RBA and RMA are "driving the services to transform their structures and warfighting doctrines from an Industrial Age model to one embodied in today's successful Information Age corporations" (Johns et al., 2000, p. 4). Knowledge management is seen as central to that transformation.

<div align="center">Factors that Influence Knowledge Management</div>

In order to effectively approach the implementation of knowledge management processes and systems in organizations, one must be aware of the possible factors that can influence its success or failure. Research has shown that a wide range of factors can affect KM implementation, including culture, leadership, technology, organizational adjustments, evaluation of knowledge management activities and/or knowledge resources, governing/administering knowledge activities and/or resources, employee motivation, and external factors (Holsapple and Joshi, 2000; 2002). The authors state that these factors can be grouped into three broad categories: managerial influences, resource influences, and environmental influences. Managerial influences "emanate from the organizational participants responsible for administering the management of knowledge" (Holsapple and Joshi, 2000, p. 239). Resource influences include the human, financial, knowledge, and material resources (Holsapple and Joshi, 2000, p. 241) that make KM a reality. And, finally, environmental influences affect what "knowledge resources should or can be acquired in the course of KM, as well as what knowledge

manipulation skills (e.g., human or technical) are available" (Holsapple and Joshi, 2000, p. 242). Both managerial and resource influences are considered internal to the organization while environmental influences originate from external sources (Holsapple and Joshi, 2000; 2002).

This classification of influences provides a framework for evaluating those factors that may either contribute to KM success or impose barriers to achieving success. At the same time, however, the nature of these influences are contingent on the contexts in which they are found and investigated. By understanding both the potential enablers and barriers to KM within their contexts, organizations can have a clearer roadmap from which to start and guide their KM journey.

Understanding the Military "Context"

Military organizations have a unique context in which KM must be deployed and eventually operate. The military culture, organization, and operating environment have been the subject of much past research (e.g., Dunivin, 1997; Lehman and Sicherman, 1999; Babb, 2001 CSIS, 2001). Because of the unique structural and cultural attributes, the managerial, resource, and environmental factors that influence knowledge management efforts need to be fully understood.

Research Needs

Despite the proliferation of KM research, little is known about KM in the military. While there may be a variety of reasons for the lack of research, one significant reason relates to the fact that the military services are just now beginning their KM efforts in earnest. Existing research, however, raises the need to examine the unique barriers to

KM in the military service (Plant, 2000; Bower, 2001; Johns et al, 2000).   As such, the

purpose of this research is to examine managerial, resource, and environmental

influences that act as barriers to KM implementation and execution in the military

services.   Such research would be beneficial in that identifying influences may aid the

military in circumventing or overcoming implementation barriers and, as a result,

facilitate the implementation of KM activities. As such the general research questions for

this study are:

1. What are the managerial influences that act as barriers to KM programs in the U.S.

   military?

2. What are the resource influences that act as barriers to KM programs in the U.S.

   military?

3. What are the (external) environmental influences that act as barriers to KM programs

   in the U.S. military?

4. How do managerial, resource, and environmental influences impact KM

   implementation in U.S. military organizations?

CHAPTER TWO—LITERATURE REVIEW

Transition from Information Age to Knowledge Age

In his 1980s best-seller, *Megatrends*, John Naisbitt proposed that our industrial

society had transformed itself into an information society. Although this transformation

began in earnest around 1956-57, it was not readily identifiable until years later (Naisbitt,

1984). A similarly hard-to-recognize transformation has occurred in the shift from

Naisbitt's Information Age to today's Knowledge Age. Even at the peak of discourse

about the implications of the Information Age, discussion of the true utility of

information remained at the periphery. Not until the early 1990s, when technology began

to enable the proliferation of data and information at reduced cost and effort, did workers

and managers alike realize that they were "drowning in information, but starved for

knowledge" (Naisbitt, 1984, p.17).

Transition Models

Many models attempt to describe our society's transition into the knowledge age.

They examine the transition through different "lenses" and viewpoints. The *Evolution of*

Management Thought by Amidon (1997) addresses this transition. This model shows

how focus has changed over time (Figure 1). From the 1950s to the 1970s, the computer

industry was very data-intensive, focusing on automating data in order to enhance

product improvement efforts. Also, management during this time was very accounting-

focused. From the 1970s to the 1990s, the focus shifted to information. During this time

competition intensified and attention shifted toward the end user. Elaborate market

segmentation schemes were developed and the packaging of solutions and systems

integration became a priority (Amidon, 1997). Strategic planning, with its statistical

tracking mechanisms and comprehensive planning processes and tools, also made its

debut during this period.

1950s-1970s	1970s-1990s	21st Century
Data	Information	Knowledge
Product	Solution	Innovation
Accounting	Strategic Planning	Strategy
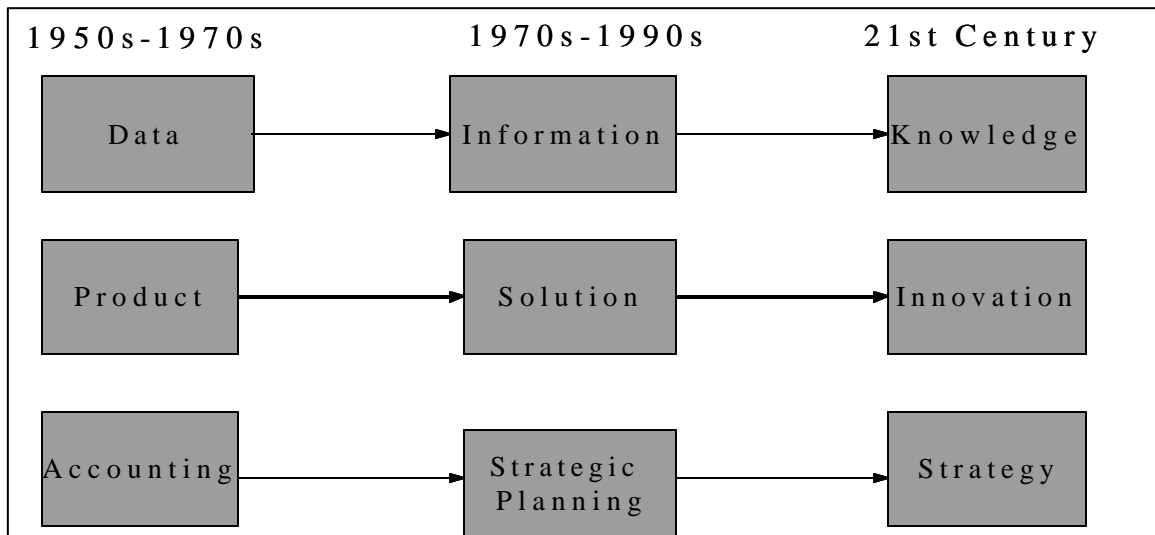
Figure 1. Evolution of Management Thought (Amidon, 1997, p. 8)

As we enter the 21st century, theorists and practitioners alike have realized that

information itself is not as important as the context in which it is used and also the value

it contributes to the organization (Amidon, 1997). This information-turned-knowledge is

the seed of innovation which becomes the key to future success. As for management

style in the knowledge economy, strategic planning has now become more a matter of

strategy and the art of leadership than of sophisticated plans.

The Historical Phases Model makes apparent the transition to the Knowledge Age

(Drucker, 1993). In describing major historical phases (Figure 2), Drucker explains how

society is rapidly progressing from a management revolution to a knowledge revolution. The swift ascendancy of social progress, or societal change, from the management revolution that began in the 1950s to the knowledge revolution is paralleled by the rapid shift from the Information Age to the Knowledge Age. In retrospect, it may even be said that the Information Age was simply the necessary "technological precursor" to what has become the Knowledge Age.
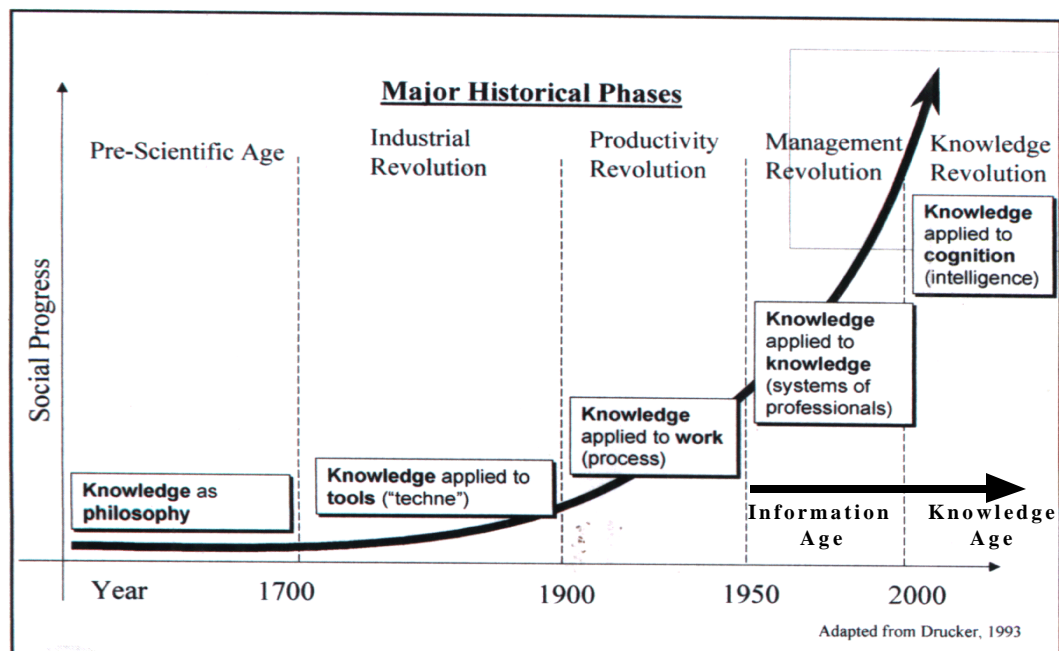
Figure 2. Evolution of the Knowledge Paradigm

The Evolution of Computing Technologies. Grover and Davenport (2001) also discuss the transition from the Information to the Knowledge Age in terms of the evolution of computing technologies and their increasing level of impact. According to Grover and Davenport:

The first level of impact was clearly at the point work got done and

transactions (e.g., orders, deposits, reservations) took place. The

inflexible centralized mainframe of the 1960s allowed for little more than

massive number crunching, commonly known as electronic *data*

processing. Organizations became heavy at the bottom and data

management systems were used to keep the data in check. Also, the

management *information* system of the 1970s was used to aggregate these

data into useful information reports, often prescheduled, for the control

level of the organization—people who were making sure that

organizational resources like personnel, money, and physical goods were

being deployed efficiently. …The advent of the PC in the 1980s brought

an organic component into a general mechanistic systems environment.

Managers could use decentralized computing power to cater to their own

unstructured data and information needs. These decision support systems,

along with easy to use fourth-generation languages, distributed

informational control to the individual managers. The mid-to-late 1980s

brought a more proactive approach to information and systems under the

umbrella term of strategic information systems. Key issues focused on

organization effectiveness, inter-organizational deployment, and

competitive advantage. (2001, p. 5-6)

Despite these advances, Grover and Davenport (2001) argue that the focus of all these

systems was still on information. It was not until the Internet and related technologies

made data and information abundant, that attention turned to knowledge as the high-value form of information.

Although in different ways, these models and descriptions each indicate that the transition from the Information Age to the Knowledge Age has occurred. While many organizations and individuals have not made the same mental or physical transition, Drucker warns that "the future…has already happened" (1998, p. vii). For both public and private sector organizations to be successful in the 21st century, they must understand the implications of the Knowledge Age and begin to see knowledge as a critical strategic resource.

What Is Knowledge?

Any discussion of the knowledge age brings up the question of how to define knowledge. This question has "occupied the minds of philosophers since the Greek era and has led to many epistemological debates" (Alavi and Leidner, 2000, p. 108-109). Although it is unnecessary for the purposes of this paper to explore all posited definitions from the perspective of ancient or modern philosophy, the study offers a pragmatic definition followed by a summary of views existing in the information technology (IT), strategic management, and organizational theory literature.

Defining Knowledge

According to Grover and Davenport, knowledge can be defined "as the most valuable form of content in a continuum starting at data, encompassing information, and ending at knowledge" (2001, p.6). To explore the elements of this continuum we begin first with data. Davenport and Prusak (1998) state that data is a set of discrete, objective

facts about events. Data is important to organizations for many reasons but mainly

because it is the raw material for the creation of information (Davenport and Prusak,

1998). Where data does not have meaning in and of itself, information is described as

"data endowed with relevance and purpose" (Drucker, 1998, p.101), or "data that makes

a difference" (Davenport and Prusak, 1998). According to Nonaka and Takeuchi,

"information provides a new point of view for interpreting events or objects, which

makes visible previously invisible meanings or sheds light on unexpected connections"

(1995, p. 58). Churchman (1971) stated, however, that the true value of information is

determined by the receiver and not by the sender.

If data becomes information when value is added, information becomes

knowledge when insight, abstractive value, or better understanding is added. Even with

the idea that knowledge is a much broader concept than data or information, it is still a

concept we have a hard time defining. In the words of Speigler, "[knowledge] has the

curious characteristic of changing into something else when we talk about it. This hide-

and-seek notion of knowledge may partially explain why any attempt to capture, record,

or store knowledge turns it back into information or data" (2000, p.4). In an effort to

capture the many aspects of knowledge, Davenport and Prusak suggest that:

> Knowledge is a fluid mix of framed experience, values, contextual information,
> and expert insight that provides a framework for evaluating and incorporating
> new experiences and information. It originates and is applied in the minds of

knowers. In organizations, it often becomes embedded not only in documents or

repositories but also in organizational routines, processes, practices, and norms.

(1998, p. 5)

While the above discussion implies a hierarchical view of data, information, and

knowledge, Alavi and Liedner argue that

…the presumption of a hierarchy from data to information to knowledge each

varying along some dimension, such as context, usefulness, or interpretability,

rarely survives scrupulous evaluation. What is key to effectively distinguishing

between information and knowledge is not found in the content, structure,

accuracy, or utility of the supposed information or knowledge. Rather knowledge

is information possessed in the mind of individuals: it is personalized information

(which may or may not be new, unique, useful, or accurate) related to facts,

procedures, concepts, interpretations, ideas, observations, and judgements. (2001,

p. 109)

An "iconoclastic" (Alavi and Leidner, 2001, p. 109) view of the data-information-

knowledge hierarchy comes from Tuomi (1999). Tuomi suggests that the popular

assumption of a data to knowledge hierarchy is actually reversed. He believes that

knowledge exists before information can be formulated and before data can be measured

to form information. "Tuomi argues that knowledge exists which, when articulated,

verbalized, and structured, becomes information which, when assigned a fixed

representation and standard interpretation, becomes data" (Alavi and Leidner, 2001,

p.109). The important part of this argument is that "knowledge does not exist outside an

agent" --a knower (Alavi & Leidner, 2001). As such, knowledge "resides in a person's mind" (Alavi & Leidner, 1999), and is shaped by what goes on in one's head, the inflow of new stimuli, and one's own initial stock of knowledge (Fahey and Prusak, 1998; Tuomi, 1999).

Alternative Perspectives of Knowledge

In presenting alternative perspectives of knowledge, Alavi and Leidner (2001) state that "Knowledge may be viewed from several perspectives (1) a state of mind, (2) an object, (3) a process, (4) a condition of having access to information, or (5) a capability" (Table 1).

Table 1. Perspectives of Knowledge and Interpretation

Perspective of Knowledge	Interpretation
Knowledge vis-à-vis data and information	Data is facts, raw numbers. Information is processed/interpreted data. Knowledge is personalized information.
State of mind	Knowledge is the state of knowing and understanding.
Object	Knowledge is an object to be stored and manipulated.
Process	Knowledge is a process of applying expertise.
Access to information	Knowledge is a condition of access to information.
Capability	Knowledge is the potential to influence action.

(Adapted from Alavi and Leidner, 2001)

Despite the many definitions and interpretations of the term of knowledge, Fahey and Prusak state in "The Eleven Deadliest Sins of Knowledge Management," that it is crucial for every organization to develop a working definition of knowledge that is appropriate for its situation. Fahey and Prusak explain:

The tendency to avoid grappling with what knowledge is should not be

surprising. There is little in the education, training, or organizational

experience of managers that prepares them for the deep-seated reflection

and understanding required by the concept of knowledge. Moreover, this

situation is exacerbated by some recent popular management literature that

directly advocates not making distinctions between theses concepts. The

argument advanced by these authors is that contemplation of such

distinctions distracts managers from the necessary task of managing.

However, upon reflection upon concepts and the distinctions among and

between them is the essence of the process of "knowing" or learning.

(1998, para. 4)

For the purposes of this dissertation, Davenport and Prusak's (1998) definition of

knowledge cited previously will used. This definition encompasses the hierarchical view

of data, information, and knowledge while acknowledging both the individual and

organizational aspects of knowledge existence.

Taxonomies of Knowledge

"Drawing on the work of Polanyi (1962, 1967), Nonaka (1994) explicated two

dimensions of knowledge in organizations: tacit and explicit" (as cited in Alavi &

Leidner, 2001, p. 110). Tacit knowledge tends to be subjective in nature (Nonaka and

Takeuchi, 1995), is embedded in individuals' brains, and has to do with experience and

know-how. Explicit knowledge, which is objective in nature (Nonaka and Takeuchi,

1995), is primarily codified, or document-centric knowledge that is about past events and

objects. Recognition of the difference between these two broad categories of knowledge is essential to understanding the process of knowledge creation (Nonaka and Takeuchi, 1995). According to Tiwana, the "knowledge creation processes can be thought of as those activities that surround the conversion of subjective tacit knowledge (based on experience) to objective explicit knowledge" (2000, p. 66). Although "tacit" knowledge is much harder to articulate, formalize, and capture, it is ultimately the most valuable and most sought after type of knowledge in any organization.

Although the tacit-explicit knowledge classification is widely cited, there are other knowledge classifications that explore the subtleties of the tacit-explicit dimension. Alavi and Leidner (2001) summarize these as shown in Table 2. While it is important to know these additional classifications exist, for the purposes of this dissertation the simple tacit-explicit delineation will be used. The primary focus of military "knowledge" efforts is currently on explicit knowledge capture, transfer, and retrieval. Tacit knowledge capture, transfer, and retrieval, although acknowledged as critically important, is at this time a secondary focus. Because military service knowledge-focused programs are still in the early formation and implementation stages, more complex views of knowledge are inappropriate and sometimes confusing. In addition to the utility of the tacit-explicit dimension of knowledge, Alavi and Leidner's (2001) description of "pragmatic" knowledge best describes the military services' primary area of concern.

Table 2. Knowledge Taxonomies and Examples   (Alavi and Leidner, 2001, p. 113)

Knowledge Types	Definitions	Examples
Tacit	Knowledge is rooted in actions, experience, and involvement in specific context	Best means of dealing with specific customer
Cognitive tacit	Mental models	Individual's belief on cause-effect relationships
Technical tacit	Know-how applicable to specific work	Surgery skills
Explicit	Articulated, generalized knowledge	Knowledge of major customers in a region
Individual	Created by and inherent in the individual	Insights gained from completed project
Social	Created by and inherent in collective actions of a group	Norms for inter-group communication
Declarative	Know-about	What drug is appropriate for illness
Procedural	Know-how	How to administer a particular drug
Causal	Know-why	Understanding why the drug works
Conditional	Know-when	Understanding when to prescribe the drug
Relational	Know-with	Understanding how the drug interacts with other drugs
Pragmatic	Useful knowledge for an organization	Best practices, business frameworks, project experiences, engineering drawings, market reports

Knowledge Management in Organizations

The importance of knowledge has been recognized throughout history. Sir

Francis Bacon wrote in 1597, "knowledge is power." More recently, organizations have

begun to take on a similar view recognizing that "knowledge," as opposed to

"information" or "data," is the most strategically significant organizational resource

(Drucker, 1993; Earl, 2001; Nidumolu, et al, 2001; Zack, 1999) and the key to future

organization success, competitive advantage (Korn/Ferry, 2000; KPMG, 2000) and

innovation (Amidon, 1997; KPMG, 2000). To further this idea, Becerra-Fernandez

remarks,

> The widely held belief that the richest resource of today's organizations is
>
> the knowledge residing individually and collectively among employees
>
> reflects the importance of processes for promoting the creation, sharing,
>
> and leveraging of knowledge. (2001, p. 24)

Despite the growing importance of knowledge and knowledge processes, it has been

recognized that organizations do not manage either very well (Marshall, Prusak, and

Shpilberg, 1996; Davenport, Jarvenpaa, and Beers, 1996; Fahey and Prusak, 1998). The

attempt to focus on and better manage knowledge and knowledge processes has led to the

evolution of the concept and practice of knowledge management (KM).

<div align="center">What Is Knowledge Management?</div>

Just like the term "knowledge," the term "knowledge management" (KM) is also

difficult to define. Table 3 provides a sampling of the more prominent definitions from

the KM literature. In reality, the context in which KM is employed and the types of

problems it is used to solve ultimately determine its appropriate definition for any

organization. What is most important, however, is that each of these definitions focuses

on the use of knowledge to improve ways of doing business and creating value.

Although KM has gotten a bad name in some circles due to the failed claims of

consultants out to make a fast dollar, the reality is that KM is here to stay. Spiegler

(2000), addressing the issue of whether KM is a "new idea" or "recycled concept,"
determined that KM is truly a new idea apart and separate from information systems,
decision support systems, and data management of the past due to the uniqueness of the
"knowledge" element. Nonetheless, the business drivers behind the move to KM are so
compelling that most industry analysts insist that companies not already using KM to
harness their intellectual assets must do so soon or face extinction (Klasson, 1999).

Table 3. Sampling of Knowledge Management Definitions

KM Definition	Author(s)
…a conscious strategy of getting the right information to the right people at the right time.	O'Dell, Grayson, and Essaides (1998)
A discipline that promotes an integrated and collaborative approach to the creation, capture, organization, access, and use of an enterprise's information assets. These assets include documents, databases, spreadsheets, and other information sources and the tacit expertise, insight, and experiences of individual employees.	Gartner Group (2001)
[the process of] turning data (raw material) into information (finished goods) and from there into knowledge (actionable goods)	Kanter (1999)
The systematic, explicit, and deliberate building, renewal, and application of knowledge to maximize an enterprise's knowledge-related effectiveness and returns from its knowledge assets.	Wiig (1993)
…management of organizational knowledge for creating business value and generating a competitive advantage.	Tiwana (2000)
…the art of creating value from an organization's intangible assets	Sveiby (1997)
…a systematic and organizationally specified process for acquiring, organizing, and communicating both tacit and explicit knowledge of employees so that others may make use if it to be more effective and productive.	Alavi and Leidner (1999)

Enablers of Knowledge Management

A variety of literature addresses the enablers of knowledge management (O'Dell et al, 1998; Havens and Knapp, 1999; Cho, Jerrell, and Landay, 2000). Enablers can be seen as those things, processes, or actions that make knowledge management in organizations possible. Although the literature is varied, common themes are evident. For instance, Havens and Knapp (1999) state that *content, community, and computing* are the principal enablers while Cho, Jerrell & Landay choose *people, process, and technology*. Grayson, O'Dell, and Essaides (1998) present one of the more popular models in their work, *If We Only Knew What We Know*. In this work they identify the four critical enablers of KM as: *infrastructure, technology, culture, and measures*.

According to Grayson, O'Dell, and Essaides (1998), creating an institutional capability for knowledge transfer requires designing and aligning the four enablers of transfer. These enablers are the basis for establishing an organization's capacity to build a strong KM base of capability. The enablers are described as follows.

Culture—the combination of shared history, expectations, unwritten rules, and social mores that affects the behavior of everyone. Of the four enablers, it is the most potent and difficult to alter. It requires strong leadership to define the organizational values and to institutionalize those values through strong indoctrination and training programs (Selznick, 1957).

Infrastructure—the mechanisms required to ensure [knowledge] flows throughout the organization. These mechanisms link the technologies, work processes, and networks of people who carry out KM activities. It requires an organizational structure to be built that

supports the processes: ensuring that line and staff roles will support the new institutional

capabilities for knowledge transfer. Finally, infrastructure includes the cross-functional

management processes that are indicative of a culture that values KM as a central

capability of the organization.

Technology—information technologies such as collaborative tools, groupware,

knowledge-enabled intranets that facilitate communication and transfer of knowledge.

Measures—processes put in place to ensure the adequate utilization of limited resources

as a result of the development and management of knowledge management capabilities.

Because all these enablers are essential, no single one is sufficient in creating an

institutional KM capability. "All must work in concert" (Grayson et al, 1998, p. 71) in

order to have truly successful organizational knowledge transfer and knowledge

management.

Knowledge Management Project/Program vs. Knowledge Management System

Given the discussion of enablers, it is clear that technology is an essential element

of any KM effort (Speigler, 2000; Alavi and Leidner, 1999, 2000; O'Dell et al., 1998;

von Krogh, 1998, Hildebrand, 1999, et al.). In fact, some KM research focuses

exclusively on knowledge management systems (e.g., Alavi and Leidener, 1999; Chait,

1999; Nissen et al., 2000). These systems come in the form of many different

information technology applications, with the common element being their technical

support for organization knowledge management efforts. Although research of KMSs

may allow for a more discrete unit of analysis, this research effort will instead focus on

knowledge management projects/ programs. For purposes of this research, the terms

"project" and "program" are considered to be equivalent. According to Davenport,

DeLong, and Beers, "the practical realities of knowledge management [can be] addressed

by focusing on a tangible, pragmatic entity, the knowledge management project" (1998,

p. abstract). The investigation of knowledge management projects/programs versus

knowledge management systems allows a wider scope, extending beyond technology to

other important issues, such as the people, process, and measures involved in how

organizations approach knowledge management. By choosing the knowledge

management project/program as the unit of analysis, it will be possible to bound the

research while still enabling a broader picture of knowledge management implementation

issues.

<div align="center">Why Knowledge Management for the Military?</div>

According to Yogesh Malhotra, "Knowledge management is not only relevant for

the IPO-driven dot.com e-businesses, but also equally relevant for non-profit and public

sector organizations as well as national and regional governments of the world" (2000,

p.3). Understanding this, the Federal Government and the Department of Defense (DoD)

are beginning to address operations in light of new Knowledge Age [1] realities. Both have

identified the need to have a knowledge management strategy to achieve strategic

objectives (Federal CIO Council Strategic Plan, 2000; OASD/C3I, 2000c). Specifically,

Joint Vision 2020 and service doctrines all tout the concept of "information superiority"

and "knowledge superiority" as critical core competencies necessary for warfighting in

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[1] The terms Information Age and Knowledge Age are often used interchangeably in military literature. Although the term "Information Age" is used more extensively, the concepts addressed in most cases imply a knowledge-age orientation.

the future (Joint Chiefs of Staff, 2000; OASD/C3I, 2000a, 2000b, 2000c). In military

circles, the terms "revolution in business affairs" (RBA) and "revolution in military

affairs" (RMA) describe the two significant spheres of change being experienced by the

military as a result of the Information/Knowledge Age (Johns et al, 2000; OASD/C3I,

2000b). The RBA represents the changes concentrated in the commercial sector, which

are also significantly affecting military business processes, such as e-commerce, business

process improvement, and re-engineering. (OASD/C3I, 2000b). The RMA, however,

includes the use [of] new technology to transform the way in which military units can

wage war (Owens, p. 10; OASD/C3I, 2000b). Both RBA and RMA are "driving the

services to transform their structures and warfighting doctrines from an Industrial Age

model to one embodied in today's successful Information Age corporations" (Johns et al,

2000, p. 4). Knowledge management is seen as central to this transformation.

Not only are the RBA and RMA driving each of the individual services to

transform, but they are also impacting how they operate together in a joint service

environment. As such, the drivers for knowledge management in the military extend

beyond individual service boundaries into the joint service arena. As the technical

limitations to communication and data/information/knowledge transfer between the

services decreases, the opportunity to integrate operations grows. Accordingly, as the

design of military operations move closer to the concepts of network-centric warfare and

decision/reaction times are further reduced, the necessity of integrating separate service

information and knowledge bases (whether human or computer-based) are becoming

imperative. Admiral Bill Owens, in his book "Lifting the Fog of War," describes three

conditions for combat victory—dominant battlespace knowledge, near-perfect mission

assignment, and immediate/complete battlespace assessment (2000, p. 100). The

understanding and use of knowledge management practices will certainly be necessary in

facilitating these conditions in and among each of the services.

<div align="center">Status of Knowledge Management in Today's Military</div>

Although KM is still a relatively new concept for the military services, each is

approaching it independently (OASD/C3I, 2000c). The Army and Navy are both

aggressively pursuing extensive KM initiatives via enterprise-level KM strategies. The

Army began practicing de-facto KM in the mid-1980s and expanded KM practices into

the regular Army in the 1990s (Bower, 2001). *Army Knowledge Online (AKO)*,

(www.army.mil/ako), originally designed in 1995 as a basic information web-site, has

recently been reconfigured and expanded to serve as a knowledge portal and

collaboration platform for the entire Army. The AKO Strategic Plan states that

"…innovative strategies [must be] developed to…effectively transform the Army into a

knowledge-based organization" (Office of the Director, Information Systems for

Command, Control, Communications, and Computers, 2001, p. 18). The Navy, which

also oversees the Marine Corps, has also developed a service-wide knowledge

management vision and strategy, which was incorporated into the Department of the

Navy (DON) Information Management/Information Technology Strategic Plan (2001).

The Navy's enterprise portal, referred to as "the Port", "is being designed to provide the

DON with one fully customizable, web-enabled portal into all electronic information

assets in the DON" (Tate, 2001, p.7). The Air Force, on the other hand, has been a bit

slower in adopting an enterprise KM strategy, but is making serious preparations in that direction (Nguyen, 2000). The Air Force's knowledge management policy is in draft form and communities of practice are being established to build support for the launch of the service's enterprise portal early 2002 (Caterinicchia, 2001).

<div align="center">A Framework for Knowledge Management Research</div>

The study of knowledge itself is not a new topic. Although there has been much scientific research in the social and psychological sciences pertaining to knowledge use and transfer since the 1950s, business emphasis on the topic has been more recent (Grover and Davenport, 2001, p.11). Because study of the knowledge management phenomena is still relatively young, a logical research stream has only recently begun to emerge (Grover and Davenport, 2001; Alavi and Leidner, 2001; Holsapple and Joshi, 2001). Given the immature nature of KM in the military, a framework for research was chosen that would best facilitate investigation of the research questions. The framework, called "influences on the management of knowledge", is based on work by Holsapple and Joshi (1998, 1999, 2000, 2001, 2002) and is an extension of their continued work as a part of the Kentucky Initiative for Knowledge Management.

<div align="center">*Knowledge Management Episode*</div>

In order to further define the "influences" framework, an underlying concept, the knowledge management episode (KME), must first be described. The KME is an integral part of the "influences" framework. The KME concept comes from the communications literature, referring to a pattern of activities performed by multiple processors with the objective of meeting some knowledge need" (Holsapple and Joshi, 2001, p.41).

Holsapple and Joshi state, "An organization's knowledge workers use their knowledge

handling skills, plus the knowledge at their disposal, in performing an assortment of

knowledge activities. Such activities can be examined at various levels of analysis and

characterized in various ways" (2000, p. 236). By synthesizing activities identified in the

KM literature, Holsapple and Joshi provide the following set of generic knowledge

activities: "acquiring knowledge (from sources external to the organization), selecting

knowledge (from the organization's own resources), generating knowledge (by deriving

it or discovering it), internalizing knowledge (through storage and/or distribution within

the organization), and externalizing knowledge (either explicitly or implicitly in the

organization's outputs)" (2000, p.237). Holsapple and Joshi further define KME:

> A particular instance of a knowledge activity in an organization can be
>
> carried out by a human-based processor (e.g., an individual knowledge
>
> worker, a group), a computer-based processor (e.g., an intelligent agent) or
>
> a hybrid. Occurrences of specific processors performing specific activities
>
> are connected by knowledge flows. An operational objective of KM is to
>
> ensure that the right knowledge is available to the right processors, in the
>
> right representations and at the right times, for performing their
>
> knowledge activities….The pursuit of this objective yields a panorama,
>
> unfolding over time, of specific instances of knowledge activities with
>
> their connecting knowledge flows. The specific instances of knowledge
>
> activities and their associated knowledge flows are termed knowledge
>
> management episodes (KMEs). (2000, p. 237)

Furthermore, they explain:

> In the conduct of KM, organizational knowledge resources are operated on
>
> by human and/or computer processors in performing knowledge
>
> manipulation activities to create value for the organization in the form of
>
> learning and projections. The conduct of KM is constrained and
>
> facilitated by a variety of influences factors, and it unfolds in an
>
> organization as a pattern of interrelated KM episodes. (2001, p.41)

As illustrated in Figure 3 below, "each KME is triggered by a knowledge need and

culminates when that need is satisfied (or the episode is abandoned). A KME involves

the execution of some configuration of knowledge manipulation activities by some

assortment of processors operating on available knowledge resources to develop the

needed knowledge" (Holsapple and Joshi, 2001, p. 41).
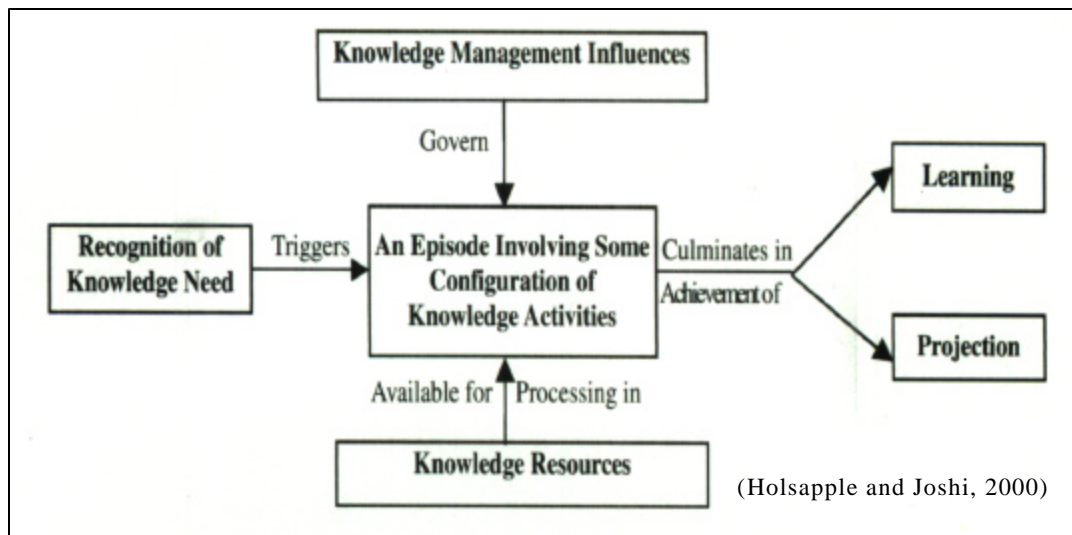
Figure 3. Architecture of a Knowledge Management Episode (KME)

Framework of Influence Factors

Using the "architecture of a KM episode" as a foundational model, this research

focuses on "knowledge management influences." "KM influences are concerned with

what impacts an organization's conduct of KM and what governs its performance of

knowledge manipulation activities" (Holsapple and Joshi, 1998, p. 4). Holsapple and

Joshi further expanded the knowledge management influences "box" of the original KME

model with their follow-up research titled, "An investigation of factors that influence the

management of knowledge in organizations" (2000). In doing so they built an influences

framework (Figure 4) that is used as a foundation for this research. This framework

"characterizes major influences on KM, which governs patterns of knowledge activities

and the nature of knowledge resources on which they operate" (Holsapple and Joshi,

2000, p. 238). Given the fact that knowledge management and accompanying knowledge

management research is relatively new to all the military services, an examination of the

influences that act as barriers to its implementation is an appropriate starting point.

Factors that Influence KM

The influences framework (Holsapple and Joshi, 2000) is based the results of a

Delphi study that attempted to synthesize a broad range of factors, identified in the

literature, that influence knowledge management initiatives. The factors and their sources

in the literature have been identified as: "culture (Leonard-Barton, 1995; Arthur

Andersen and APQC, 1996; Suzulanski, 1996; van der Spek and Spijkervet, 1997),

leadership (Arthur Andersen and APQC, 1996), technology (Arthur Andersen and

APQC, 1996; van der Spek and Spijkervet, 1997), organizational adjustments (Szulanski,

1996; van der Spek and Spijkervet, 1997), evaluation of knowledge management activities and/or knowledge resources (Wiig, 1993; Andersen and APQC, 1996; van der Spek and Spijkervet, 1997), governing/administering knowledge activities and/or knowledge resources (Wiig, 1993; Leonard-Barton, 1995; Szulanski, 1996; van der Spek and Spijkervet, 1997), employee motivation (Szulanski, 1996, van der Spek and Sijkervet, 1997), and external factors (van der Spek and Spijkervet, 1997)" (Holsapple and Joshi, 2000, p. 239). A summary of these influence factors by author is presented in Table 4.

Using previous work (Holsapple and Joshi, 2002) as a foundation, Holsapple and Joshi's Delphi study finalized the organization of the influence factors into three categories: managerial influences, resource influences, and environmental influences (Holsapple and Joshi, 2000). The interplay among what has been described previously as the KME and the categories of influence factors is depicted in Figure 4. In examining the three categories of influences, managerial influences have been emphasized the most as "they [have been] most apt to be under the control of persons responsible for KM initiatives" (Holsapple and Joshi, 2000, p. 239).

Table 4. Summary of Knowledge Management Influences

Author	Influences on Conduct of Knowledge Management
Leonard-Barton, 1995	1. Managerial systems (e.g., education, reward, and incentive systems). Values and norms (e.g., system of cast and status, rituals of behaviors, passionate beliefs
Arthur Andersen and APQC, 1996	1. Culture 2. Leadership 3. Measurement 4. Technology
Wiig, 1993	1. Exploring knowledge and its adequacy (survey & categorize knowledge, analyze knowledge & related activities, elicit, codify & organize knowledge) 2. Assessing value of knowledge (appraise & evaluate knowledge and related activities) 3. Managing knowledge activity (synthesize knowledge related activities; handle, use, and control knowldge, leverage, distribute, automate knowledge)
van der Spek and Spijkervet, 1997	1. Conceptualize (gain insights about the conduct of KM) 2. Reflect (access qualities and plan improvements) 3. Retrospect (evaluating the performance of the knowledge manipulation activities and the result from those activities (Items 1, 2, and 3 guide the structuring of knowledge manipulation activities) 4. Internal developments (culture, employee motivation, organizational adjustments, management, technology) 5. External developments

Table 4. (cont)

Szulanski, 1996	1. Characteristics of knowledge transfer (includes causal ambiguity and unproveness)
	2. Characteristics of knowledge source (includes lack of motivation, perceived unreliability)
	3. Characteristics of knowledge recipient (includes lack of motivation, absorbtive and retentive capacity)
	4. Characteristics of the context (includes barren organizational context and arduous relationship)

(Holsapple and Joshi, 1999, p. 14)

Figure 4. Knowledge Management Influences   (Holsapple and Joshi, 2000, p. 238)
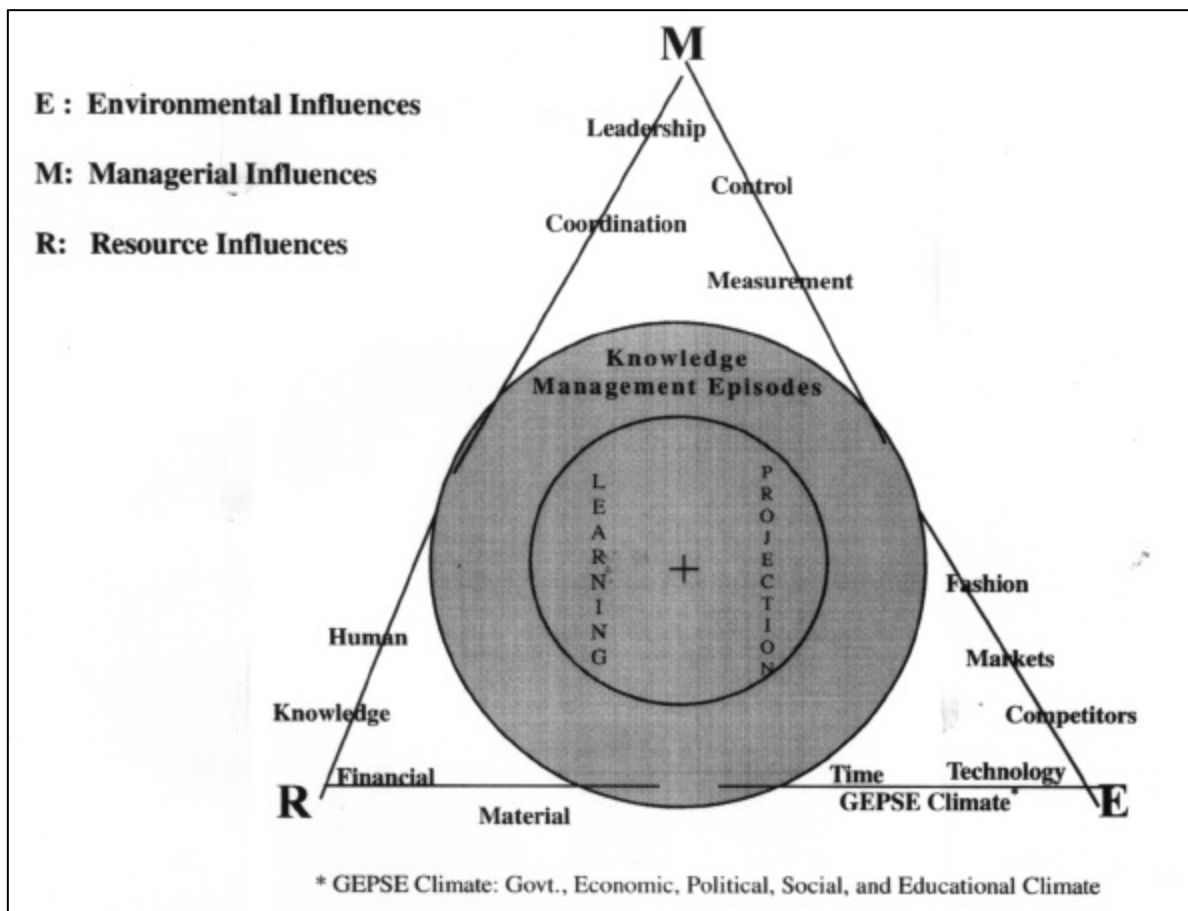
Managerial Influences

Managerial influences emanate from individuals responsible for administering the management of knowledge in organizations. Holsapple and Joshi's framework (2000) partitions these influences into four main factors: exhibiting leadership in the management of knowledge, coordinating the management of knowledge, controlling the management of knowledge, and measuring the management of knowledge.

Leadership. Of the four managerial influences, leadership is primary. Much of the knowledge management literature identifies leadership as a critical element to success (Davenport and Prusak, 1998; Grover and Davenport, 2001; Korn/Ferry, 2000; Heibeler, 1996, et al.). As Selznick explains, the "task of building special values and a distinctive competence into the organization is a prime function of leadership. …in this sense, the leader is an agent of institutionalization, offering a guiding hand to a process that would otherwise occur more haphazardly, more readily subject to the accidents of circumstances and history" (1957, p. 27). Although Selznick was not talking about leadership in knowledge management per se, his words are equally applicable.   According to Holsapple and Joshi,

> [The] distinguishing characteristic of leadership is that of being a catalyst through
> such traits as inspiring, mentoring, setting examples, engendering trust and
> respect, instilling a cohesive and creative culture, listening, learning, teaching
> (e.g., through storytelling), and knowledge sharing….The KM leader creates
> conditions that allow participants to readily exercise and cultivate their knowledge
> manipulation skills, to contribute their own individual knowledge resources to the

organization's pool of knowledge, and have easy access to relevant knowledge

resources. (2000, p. 241)

For KM to be successful, KM leaders must exist at every level of the organization.

Although the most visible leader may be a Chief Knowledge Officer (CKO) or an

equivalent role, the "cadre of managers who understand knowledge and its uses in

various aspects of the business, the motivational and attitudinal factors necessary to get

people to create, share, and use knowledge effectively, and the ways to use technology to

enhance knowledge activities" (Grover and Davenport, 2001, p. 10) are equally

important. To be a good KM leader and to build good KM leaders depends on an

understanding of knowledge resources, knowledge activities, and of the other KM

influences.

Coordination. According to Malone and Crowston, "coordination is managing

dependencies between activities" (1994, p. 90). Further defined, coordination is an

activity that attempts to interrelate and harmonize activities in an organization (Holsapple

and Whinston, 1996). The process of using knowledge to propel organization innovation

can be planned and structured or unplanned and unstructured. In the context of KM, a

"planned approach requires coordination within and across KMEs, involving the

determination of what knowledge activities to perform in what sequence, which

participants will perform them, and what knowledge resources will be operated on by

each" (Holsapple and Joshi, 2000, p. 239).

In managing knowledge, there are many dependencies that must be managed. These include:

> …dependencies among knowledge resources (e.g., alignment of participants' knowledge with strategy, diffusion of knowledge among participants), those among knowledge activities (e.g., which activities are undertaken under varying circumstances), those between knowledge resources and other resources (e.g., what financial resources are to be allocated for knowledge activities), and those between resources and knowledge activities (e.g., use of knowledge activities to improve knowledge resources). (Holsapple and Joshi, 2000, p. 240)

In addition to managing dependencies, coordination also involves "marshaling sufficient skills for executing various activities, arrangement of those activities in time (within and across KM episodes), and integrating knowledge processing with an organization's operations (e.g., What knowledge activities are involved and necessary for managing inventory operations?)" (Holsapple and Joshi, 2000, p. 240). Knowledge-based organizations manage dependencies through various coordination approaches. The approaches include linking reward structures and job responsibilities to knowledge sharing and building interpersonal networks for learning and collaboration (Korn/Ferry 2000; Marshall, et al., 1996).

Control. "Control is concerned with ensuring that needed knowledge resources and processors are available in sufficient quality and quantity, subject to required security" (Holsapple and Joshi, 2000, p.240). The two critical control issues are the

protection of and quality of knowledge resources. Holsapple and Joshi summarize these two issues by stating:

> Protecting knowledge resources from "loss, obsolescence, unauthorized exposure, unauthorized modification, and erroneous assimilation is crucial for the effective management of knowledge. Approaches include legal protection (e.g., patents, copyrights), social protection (e.g., hiring people who can blend with the current culture and help sustain current values and norms), and technological protection (e.g security safeguards). In establishing sufficient controls to govern the quality of knowledge used in an organization, management needs to consider two dimensions: knowledge validity and knowledge utility. Validity is concerned with accuracy, consistency, and certainty; utility is concerned with clarity, meaning, relevance, and importance (Holsapple and Joshi, 2000, p.240).

Measurement. It is widely accepted that measurement is the least developed area in the knowledge management discipline (O'Dell, et al., 1998; Heibeler, 1996; Sveiby, 1997; et al.); however, it is possible to measure knowledge resources and activities and link them to financial results (Stewart, 1997; Sveiby, 1997; Bierly and Chakrabarti, 1996). According to Holsapple and Joshi, "measurement involves the valuation of knowledge resources and processors….It is also a basis for evaluation of leadership, coordination, and control; for identifying and recognizing value-adding activities and resources; for assessing and comparing the execution of knowledge activities; and for evaluating the impacts of an organization's KM (i.e. learning and projection) on bottom-line performance" (2000, p. 240). In the context of the influence framework, it is

understood that "KM initiatives are impacted by whether an organization attempts to measure its knowledge resources and/or performance of its knowledge activities, how it goes about measuring these, and how effective the measures are" (Holsapple and Joshi, 2000, p. 240). Measurement indicators cover a broad spectrum and can be hard and financial or soft and non-financial (Sveiby, 1997).

Resource Influences

Like managerial influences, resource influences are primarily internal to an organization. They promote or constrain in different ways an organization's ability to conduct knowledge activities.

Financial. Financial resources determine what is expended on knowledge activities. "Increasing the financial resources available for a knowledge activity…may affect the efficiency of that activity or the quality of its results" (Holsapple and Joshi, 2000, p. 241). The availability of financial resources may also affect the how managerial actions—leadership, coordination, control, and measurement—are carried out.

Human. Human resources for knowledge activities can be viewed in two ways. First of all, skills are seen as a human resource. In the case of knowledge management, knowledge manipulation skills can both constrain and facilitate KM efforts. "These skills are the essential mechanism for performing the knowledge activities that make up KM episodes" (Holsapple & Joshi, 2000, p. 241). Secondly, human resources are viewed in the way they impact managerial influences. Depending on the situation, human resources can either enable or restrict the managerial influences.

Material. Material resources can also promote or hamper knowledge manipulation

or knowledge manipulation skills in an organization. Material resources include

technical infrastructure, physical plant, and computing equipment. Any particular

knowledge activity can be carried out by a human-based processor (individual knowledge

worker, a group), a computer-based processor (e.g., an intelligent agent), or a hybrid

(Holsapple and Joshi, 2000, p. 237). In the case where computer-based participants

perform knowledge manipulation activities, the skills are recognized as material

resources.

Knowledge. Knowledge resources are the cornerstone of organizational KM. "As

the raw materials for knowledge activities, knowledge resources available in an

organization necessarily influence its KM and the resultant learning, projection, and

innovation. …Major types of organizational knowledge resources include participants'

knowledge (both human and computer-based), artifacts, culture, and strategy" (Holsapple

and Joshi, 2000, p. 241). Depending on the dimension of knowledge resources being

examined (e.g., tacit vs. explicit, descriptive vs. procedural vs. reasoning), each can be

studied as to its influence on KM (Holsapple and Joshi, 2000, p. 241).

Environmental Influences

Environmental influences are those external to an organization. They influence

what "…knowledge resources should or can be acquired in the course of KM and what

knowledge manipulation skills (e.g., human or technological) are available" (Holsapple

and Joshi, 2000, p. 242). The environmental influences identified in the Holsapple and

Joshi framework (2000) include competition, fashion, markets, technology, time, and the

GEPSE (governmental, economic, political, social, and educational) climate. Holsapple and Joshi do not explain each of these influences in detail. The entire category of environmental influences does not get much attention in the current KM literature (Holsapple and Joshi, 2000, 2002; Koch, Paradice, Chae, and Guo, 2002) because these influences are beyond the control of those individuals responsible for KM initiatives.

<div align="center">Barriers to Change/KM Implementation</div>

Organizational change is a large area of study. A subset of that research addresses organizational change from the perspective of knowledge-sharing activities and/or the concept of the learning organization (Senge, 1993). Undoubtedly, an effort to implement a knowledge-sharing or knowledge management program/project at any organization level requires organization change of some type. In order to facilitate the organization changes necessary to implement, and ultimately institutionalize knowledge management, it is beneficial to understand the influence factors that will be encountered in doing so.

Depending on how they are viewed, factors that influence organization change and knowledge management can be seen as enablers if their influence is positive or as barriers if their influence is negative. Although the labeling of such factors as barriers or enablers can sometimes be considered "two sides of the same coin", the focus of this research is to identify influence factors that act as barriers only. Holsapple and Joshi's influences framework provides an excellent starting point for evaluating the influence factors that may act as barriers to knowledge management implementation in the military.

The Military "Context" for KM

The military organization is similar to other large public and private sector organizations, but it also differs in many respects. Key differences include: culture, mission, governance, and environment. As for culture, a Center for Strategic and International Studies report stated, "…[W]hile our civil culture appropriately emphasizes liberty and individuality, military culture downplays them and emphasizes values such as discipline and self-sacrifice that stem from the imperative of military effectiveness and success on the battlefield" (2000, p. xv). The mission of the military is unique as well. No other organization is expected to "respond quickly and operate effectively, cohesively, economically, and decisively across the entire spectrum of military operations from full-scale major theater war to humanitarian relief operations to peacetime engagement" (Babb, 2001, p. 7). The civilian control of the military, the influence of U.S. government entities, and the command-and-control structure of the military also make organization governance issues and actions unique. Finally, the military must operate in an unusually complex environment. Similar to the civilian sector, the military environment includes the state of technology and the condition of the economy in the U.S. and worldwide. What is unique, however, is that the military environment also includes "all other organizations including those of our own government as well as all foreign governments, international organizations (IOs), terrorist organizations, and non-governmental organizations (NGOs), and our relationships with each of them" (Babb, 2001, p.3). Babb states, "NGOs will increase in number and influence. Other nations and terrorist groups are aggressively pursuing the development of weapons of mass

destruction (WMD). All the advanced nations of the newly globalized world will be

threatened by state and non-state actors with the means and will carry out their threats.

…The environment that the U.S. military will operate in is extremely complex, unstable,

and hostile" (Babb, 2001, p. 4).

In light of these unique characteristics, it is important to acknowledge the

organizational differences of the military because it is those differences that will

distinguish this research and allow for continued theory building. Holsapple and Joshi's

influences framework provides and excellent foundation for research, but it does not

address the sometimes peculiar and different influences that may exist in a military

environment.

<div align="center">Military KM Research</div>

Although research regarding knowledge management is growing at a fast pace,

very little has yet focused exclusively on efforts in the military. More and more

anecdotal information about military knowledge management is appearing in the popular

press and on-line (e.g., Anthes, Frizzell, @brint.com), but formal research is still lacking.

While there may be a variety of reasons for this lack of research, the most significant

reason is that the military services are just now beginning their KM efforts in earnest.

KM projects have existed in each of the services for some years (OASD/C3I, 2000c).

Many such projects, however, have been limited in scope and in benefit. In the wake of

budget cuts, personnel drawdowns, and increased mission taskings, the services are now

realizing the necessity of enterprise-wide knowledge management programs for both their

business and warfighting processes. The Navy is being increasingly recognized as a

leader in military knowledge management as well as being touted as a good example for the private sector to follow (Computerworld, 2001). Although there are many military KM success stories, existing research raises the need to examine the unique barriers to KM in the military services (Plant, 2000; Bower, 2001; Johns et al., 2000). Plant (2000), in investigating KM in the Australian Defence Force, recognized that the military is a "complex" organization/environment for KM implementation. Bower (2001) and OASD/C3I (2000c) also identified that cultural, technical, and structural aspects of the military organization require special consideration in making decisions regarding implementing knowledge management projects. Finally, Cho et al. (2000) identified cultural, technical, and process barriers to sharing knowledge in their investigation of KM in the DoD acquisition community. As such, the purpose of this research is to examine managerial, resource, and environmental influences to identify barriers to KM implementation in the U. S. military services. Such research will be beneficial in identifying influences that may aid the military in circumventing or overcoming implementation barriers and, as a result, facilitate the implementation of KM activities.

<div align="center">Research Questions</div>

In order to examine the managerial, resource, and environmental influences to identify barriers to KM in the military the following research questions will be

investigated.

1. What are the managerial influences that act as barriers to KM programs in the U.S. military?

    a. How do leadership commitment and KM reinforcing behaviors from managers at various levels impact KM efforts?

    b. What coordination issues (e.g., strategy alignment, outside organization relationships, disparate KM efforts) impact KM efforts?

    c. What technical, social, and legal control issues (e.g., issues concerning the protection and quality of knowledge resources) impact KM efforts?

    d. What "measuring" or "valuing" issues impact KM efforts?

2. What are the resource influences that act as barriers to KM programs in the U.S. military?

    a. How do financial resource issues impact KM efforts?

    b. How do human resource issues (e.g., manpower availability, KM expertise/skill, outsourcing) impact KM efforts?

    c. How do material resource issues (e.g., existing technical infrastructure, computer systems) impact KM efforts?

    d. How do knowledge resource issues (e.g., human/computer-based knowledge, organizational culture, purpose/strategy, infrastructure, knowledge artifacts) impact KM efforts?

3. What are the (external) environmental influences that act as barriers to KM programs in the military?

a. How do governmental, economic, political, social, and educational (GEPSE) climate issues impact KM efforts? How has the impact of the GEPSE climate changed over the past few years?

b. How does technology (external to the military) impact military KM efforts?

c. How have past military or industry KM strategies and results impacted current KM efforts and strategies?

d. How does "time" (i.e. response time, development time, crisis scenarios) impact the KM efforts? Has the impact of time on KM efforts changed over the past few years?

4. How do managerial, resource, and environmental influences impact KM implementation in U.S. military organizations?

These research questions address the specific influences identified in the Holsapple and Joshi framework (2000). By using these questions as a basis for examining KM in the military, the influences model can be examined for its applicability to the military environment and new theory about these influences may be developed. The research method chosen for this investigation is a case-based research methodology which has been deemed appropriate for theory building (Yin, 1994). In Chapter 3, the research design and methodology to be used in this study will be presented.

CHAPTER THREE—RESEARCH DESIGN AND METHODOLOGY

Research in Knowledge Management

The study of knowledge itself has been a subject of interest and epistemological debate since the classical Greek era. Only in the last few years, however, has knowledge gained business emphasis. This emphasis stems from the growing recognition that knowledge has become a significant organizational resource. Although much previous research regarding knowledge use and transfer has been conducted in the social and psychological sciences, Grover and Davenport (2001) describe research in the business arena as belonging to two main research streams. The first, and most prevalent, focus has been in the management and organizational area, where two major sub-streams have emerged. "The first involves theorization of why firms have performance differences. The latter view conceptualizes the firm as an institution for integrating knowledge and examines how the mechanisms for integration establish flexible response capabilities in hypercompetitive markets" (Grover & Davenport, 2001, p. 11). The second, and more empirically-based, research stream examines knowledge flows between organizational units and between organizations.

Research on knowledge in the information systems (IS) domain has mainly followed a cognitive perspective. From this perspective "knowledge was considered to be representations of the world that consist of objects and events, and the challenge of a cognitive system, computational or biological, was to represent this model as accurately

as possible" (Grover & Davenport, 2001, p. 11). It is this cognitive perspective that has provided fertile ground for organization knowledge and knowledge management (KM) research to become intricately intertwined with IS research. Specifically, IS researchers have begun promoting a class of information systems referred to as knowledge management systems (Alavi & Leidener, 2001).

The state of research on KM appears fragmented. It follows that research on KM in the U.S. military is even more lacking. Given the state of research in the KM domain, proposed research frameworks and research issues are beginning to appear in the literature (Grover & Davenport, 2001; Alavi & Leidner, 2001; Holtshouse, 1998). Each of these propositions for research addresses the general knowledge process (e.g., creation, storage and retrieval, transfer, application) and gives recognition to the need to treat knowledge systematically (Alavi & Leidner, 2001; Grover & Davenport, 2001) along those dimensions. In the words of Grover and Davenport, "The growing literature on knowledge management should continue to draw from rich theoretical perspectives, but also deal with the 'how' questions of management" (2001, p. 12).

<div align="center">Drivers for Research Design</div>

Given that the purpose of this research project is to also investigate "how" questions, the literature makes it clear that a qualitative research approach is most appropriate. According to Creswell (1994, p. 1-2), a qualitative study is "defined as an inquiry process of understanding, a social or human problem, based on building a complex, holistic picture, formed with words, reporting detailed views of informants, and conducted in a natural setting." Trauth (2001, p. 7) also states that the "amount of

uncertainty surrounding the phenomenon under study is another important factor in the choice of qualitative methods." Finally, in a qualitative study "one does not begin with a theory to test or verify" (Creswell, 1994, p. 94). This is certainly the case in investigating factors that influence KM in the military. Also, the fact that technology (i.e. knowledge management systems) is such an integral part of many KM efforts, lends to the appropriateness of qualitative research. Galliers and Land "point to the added complexity that comes from a view of information systems that includes their relations with people and organizations" They further state, "Accompanying this broadened scope of study comes greater imprecision and the potential for multiple interpretations of the same phenomenon" (1987, as cited in Trauth 2001, p. 8). Given these circumstances, alternatives to quantitative measurement are necessary.

Of the many research designs conducted in the qualitative tradition, Cresswell (1994) cites the four most commonly found in human and social science research as: ethnographies, grounded theory, case studies, and phenomenological studies. Myers (1997) offers a slightly different view offering that the more common qualitative research designs include action research, case study research, and ethnography. Regardless of the view taken, the most important point to understand is that each research design has a specific purpose. In examining these research designs in the context of the proposed research questions, it is apparent that case study design is most appropriate for the purposes of this dissertation.

Case Study Research

According to Paper (2001, para. 22), "Case studies make an excellent vehicle to explore state-of-the-art thinking because researchers can gain a better understanding of "how" and phenomena works and "why" it works the way it does." Myers (1997) explains that the term "case study" has many meanings. "It can be used to describe a unit of analysis (e.g., a case study of a particular organization) or to describe a research method" (Myers, 1997, Case Study Research section, para. 1). As they apply to this research, both meanings are appropriate in their respective contexts. In first discussing the case study as a research method, Yin provides a technical definition of the scope as follows:

"A case study is an empirical inquiry that:

- investigates a contemporary phenomenon within its real-life context, especially when

- the boundaries between phenomenon and context are not clearly evident" (Yin, 1994, p. 13).

Given this definition, the case study method should be used when the researcher wants to address contextual conditions "believing that they might be highly pertinent to [the] phenomenon of study" (Yin, 1994, p. 13).

Also, "because phenomenon and context are not always distinguishable in real-life situations, a whole set of other technical characteristics, including data collection and data analysis, now become [a] second part of [the] technical definition" (Yin, 1994, p. 13) which follows:

"The case study inquiry

- copes with the technically distinctive situation in which there will be many
  more variables of interest than data points, and as one result

- relies on multiple sources of evidence, with data needing to converge in a
  triangulating fashion, and as another result

- benefits from the prior development of theoretical propositions to guide data
  collection and analysis" (Yin, 1994, p. 13).

From these definitions it can be seen that "the case study as a research strategy comprises

an all-encompassing method—with the logic of design incorporating specific approaches

to data collection and to data analysis" (Yin, 1994, p. 13).

Although attempts to define KM as a legitimate discipline continue, much of the

current research on KM and KMS has emerged from the IS field. Given that information

systems (in the form of knowledge management systems) are so integral to many KM

efforts, this is a natural transition. In theory, the appropriateness of case study research

for knowledge management and knowledge management systems is implied as such

research has been identified as the most common qualitative method used in information

systems (Orlikowski and Baroudi, 1991; Alavi and Carlson, 1992). Furthermore, in

describing case study research strategy in IS, Benbasat, Goldstein, and Mead state, "Case

study research is particularly appropriate for certain types of problems: those in which

research and theory are at their early, formative stages, and "sticky, practice-based

problems where the experiences of the actors are important and the context of action is

critical" (Bonoma, 1983 and Roethlisberger, 1977, as cited in Benbasat, Goldstein, and Mead, 1987, p. 369). This idea fits the KM phenomenon quite well. In fact, case study research of KM is growing and becoming quite prevalent. Furthermore, as was the case in the IS field, the KM field has also seen a decrease in emphasis from technological to managerial and organizational questions (O' Dell et al., 1998; Brown and Duguid, 2000; Cohen and Prusak, 2001). Clearly, the case study research method is well-suited to KM research, because the object the discipline is the study of knowledge processes and knowledge management systems in organizations.

<div align="center">Components of Case Study Research Design</div>

Given the appropriateness of a case study approach for research of the KM phenomena--especially the military KM phenomenon--it was chosen as the research design for this dissertation research. According to Yin (1994, p. 18), "A research design is the logic that links the data to be collected (and the conclusions to be drawn) to the initial questions of a study." It is a *blueprint* or *action plan from getting here to there*, where *here* may be defined as the initial set of questions to be answered, and *there* is some set of conclusions (answers) about these questions" (Yin, 1994, p.19). When using the case study as a research design, there are five components that are critically important. These five components are:

1. a study's questions,

2. its propositions, if any,

3. its unit(s) of analysis,

4. the logic linking the data to the propositions, and

5. the criteria for interpreting the findings (Yin, 1994, p. 20).

The following paragraphs address these five components in the context of this research.

Study's Questions

The investigatory questions for this research began with a strategic overview of the organization to include organization structure, mission, knowledge management vision/program, and basic description and purpose of the knowledge management systems in use. These preliminary questions were used as a foundation and as context for the following general research questions of this dissertation:

1. What are the managerial influences that act as barriers to KM programs in the U.S. military?

2. What are the resource influences that act as barriers to KM programs in the U.S. military?

3. What are the (external) environmental influences that act as barriers to KM programs in the U.S. military?

4. How do managerial, resource, and environmental influences impact KM implementation in U.S. military organizations?

Each of the general research questions (except #4) consisted of several, more specific sub-questions. The following is a review of the focus and intent of each question/sub-questions.

Research Question #1. The focus of the first research question was to identify what managerial influences act as barriers to KM programs in the military. The sub-questions were as follows:

a. How do leadership commitment and KM reinforcing behaviors from managers at various levels impact KM efforts?

b. What coordination issues (e.g., strategy alignment, outside organization relationships, disparate KM efforts) impact KM efforts?

c. What technical, social, and legal control issues (e.g., issues concerning the protection and quality of knowledge resources) impact KM efforts?

d. What "measuring" or "valuing" issues impact KM efforts?

According to Holsapple and Joshi, "managerial influences emanate from organizational participants responsible for administering the management of knowledge (2000, p. 239). The sub-questions attempted to address the four key factors of "managerial influences" which are: leadership, coordination, control, and measurement (Holsapple and Joshi, 2000). The intent of question 1(a) was to address leadership and associated issues. Leadership is commonly recognized as a critical issue in the implementation of KM. Associated behavioral issues (i.e., do leaders and managers display behaviors that influence KM) can also be significant influences. Coordination issues are also of critical concern. Holsapple and Joshi state that KM can be left to "serendipity or planned and structured" (2000, p. 239). The intent of question 1(b) was to identify coordination issues between various organizations and possibly other KM efforts. Furthermore, the question addressed strategy coordination where issues of alignment and coherency could be examined. Question 1(c) addressed the issue of control. In general, "control is concerned with ensuring that needed knowledge resources and processors are available in sufficient quality and quantity, subject to required security" (Holsapple and Joshi, 2000,

p. 240).   The intent of this question was to identify any technical (e.g., security safeguards), social (e.g., practices that promote hiring people with similar cultural values) or legal (e.g., copyrights, classified vs. non-classified information, patents) factors that may influence KM. The final, managerial-focused question, 1(d), addressed measurement factors. Holsapple and Joshi state, "measurement involves the valuation of knowledge resources and processors" (2000, p. 240). The intent of this question was to identify if/how KM initiatives are impacted by "organization attempts to measure its knowledge resources and/or performance of its knowledge activities, how it goes about measuring these, and how effective the measures are" (Holsapple and Joshi, 2000, p. 240).

   Research Question #2. The focus of the second research question was to identify what resource influences act as barriers to KM programs in the military. The sub-questions were as follows:

   a. How do financial resource issues impact KM efforts?

   b. How do human resource issues (e.g., manpower availability, KM expertise/skill, outsourcing) impact KM efforts?

   c. How do material resource issues (e.g., existing technical infrastructure, computer systems) impact KM efforts?

   d. How do knowledge resource issues (e.g., human/computer-based knowledge, organizational culture, purpose/strategy, infrastructure, knowledge artifacts) impact KM efforts?

There are a wide range of resource factors that may influence KM in organizations. Question 2(a) addressed financial resource issues. The availability of financial resources

may impact the ability to conduct knowledge activities as well as the ultimate efficiency of those activities or the quality of their results. Financial resource issues may also impact those managerial factors of leadership, control, coordination, and measurement previously discussed. Another critical set of resource influences involve human resources. Human resource issues center around knowledge manipulation skills and the interplay with the managerial influences. According to Holsapple and Joshi, "[The] knowledge manipulation skills of an organization's participants both constrain and facilitate KM. The skills are the essential mechanism for performing the knowledge activities that make up KM episodes. In the case of human participants, these skills are human resources. …Human resources also influence KM by enabling or restricting the managerial influences" (2000, p. 241). The intent of question 2(b) was to identify these human resource issues by focusing on manpower and skill/expertise available for KM programs as well as the impact of outsourcing for KM programs/expertise. Material resource factors also influence KM. In contrast to human participants, what Holsapple and Joshi (2000; 2002) call computer-based participants can also perform knowledge manipulation activities. Question 2(c) focuses on material resources issues such as existing technical infrastructure, computer systems, and software that might impact KM efforts. The final question, 2(d), addressed knowledge resource issues. It can be seen that, as the central focus of knowledge management, knowledge resources can strongly influence KM in organizations. "As the raw materials for knowledge activities, knowledge resources available in an organization necessarily influence its KM and resultant learning, projection, and innovation. Some knowledge resources also affect KM

by serving as the basis for coordination, control, measurement, and leadership"

(Holsapple and Joshi, 2000, p. 241). Question 2(d) examines knowledge resources by

focusing on human and computer-based knowledge stores. It also focuses on the

influences that stem from human knowledge of the organization culture, purpose, and

strategy. Finally, it addresses the influences of knowledge resources in the form of

infrastructure (e.g., roles, regulations, relationships) and knowledge artifacts (e.g.,

manuals, books, video tapes, products).

 Research Question #3. The focus of the third research question was to identify

what (external) environmental influences act as barriers to KM programs in the military.

The sub-questions were as follows:

 a. How do governmental, economic, political, social, and educational (GEPSE)

  climate issues impact KM efforts? How has the impact of the GEPSE climate

  changed over the past few years?

 b. How does technology (external to the military) impact military KM efforts?

 c. How have past military or industry KM strategies and results impacted current

  KM efforts and strategies?

 d. How does "time" (i.e., response time, development time, crisis scenarios) impact

  the KM efforts? Has the impact of "time" on KM efforts changed over the past

  few years?

Whereas managerial and resource influences are internal to an organization,

environmental influences are seen to be external. In the words of Holsapple and Joshi,

"The environment influences what knowledge resources should or can be acquired in the

course of KM. It influences what knowledge manipulation skills (e.g., human or technological) are available" (2000, p. 242). Investigation of environmental influences is lacking due to the fact such influences are many and varied. Of the three categories of influences proposed by Holsapple and Joshi (2000; 2002), the environmental category is covered in the least depth. The rationale for such "light" treatment of these influences is that they are the least controllable by organizations; therefore, very little benefit comes from researching them. The list of environmental influences identified by Holsapple and Joshi (2000; 2002) include: competition, fashion, markets, technology, time, and the GEPSE (governmental, economic, political, social, and educational) climate. Although some of these influences are not directly applicable to the military in the context of their most common definitions (e.g. fashion, markets, and competition), they may still have applicability when examined from a different military perspective.

The intent of question 3(a) was to elicit the impacts of the GEPSE climate on organizational KM efforts. This question took on special meaning as many of the elements of the GEPSE climate are important in the military environment. The intent of the two-part question (both present and past tense) was to capture the potential differences in impact between administrations (both in the government and the military) and any changes recognized as a result of the new war on terrorism. Question 3(b) addressed technology influences external to the military. As opposed to the technology question posed in the resource influences section, this question focused on the opportunities, limitations, and impacts of technology being developed or deployed outside the immediate military environment. The intent of question 3(c) was to elicit the

possible influences of fashion and competition. Although neither of the terms apply in their traditional sense, it is possible that they do have a role. Part 1 of question 3(c) focuses on past military and industry KM efforts and looks to see if current KM efforts had been influenced by what had been "in vogue or trendy" in other organizations. The second part of the question focused more on the "competition" aspect of KM efforts. Although the military services do not directly compete with each other or industry in a traditional "market competition" scenario, competition, especially between the services, is still a very big issue. Because the services compete with each other for finite resources as delegated by our civilian leaders, it is important that no service appears to be lagging behind in any area (e.g. as technology, know-how, strategy). As such, the pressure to institute KM, in addition to the potential benefits it may offer, may be just another aspect of inter-service competition. The final two-part question, 3(d), focused on the influence of "time" factors. The influence of time factors can affect the ability to institute KM as well as the need for KM. As for the ability to institute KM, it may be, for instance, driven by the deadlines imposed by external entities or situations. These time deadlines may offer an opportunity to complete the KM project/program in a quality fashion or may lead to failure of a program if the deadline is unreasonable. Another important "time" influence, particularly appropriate for the military, involves the necessity of rapid crisis response. The promise of KM is the ultimate achievement of knowledge superiority, which should drastically improve decision-making and associated reaction times. The intent of the two-part question is to illicit the possible "time" factor influences as observed in the past and present.

Research Question #4. The focus of the fourth research question was to identify how the various influences work together to provide barriers to KM implementation in military. The purpose of this question was to evaluate the interplay and relationship between influences in order to identify potential negative processes or systems that thwart KM efforts.

Study Propositions

Yin states that a "proposition directs attention to something that should be examined within the scope of the study" (1994, p. 21). Given that Holsapple and Joshi (2000; 2002) have provided a KM influences framework that is considered robust in the private sector, the simple proposition of this research is that the nature of influences on KM may be found to be different in the military. Furthermore, the nature of these influences may be found to cause barriers to KM programs in the U.S. military services.

Unit(s) of Analysis

In order to effectively conduct case study research there exists a fundamental issue of defining what the case is or, more specifically, what is the unit of analysis to be studied. As a general guide, Yin states that "the definition of the unit of analysis (and therefore the case) is related to the way the initial research questions have been defined" (1994, p.21). For the purposes of this research the sample selection criteria will be military organizations which have been identified as having active knowledge management initiatives. The specific unit of analysis will be sub-units of those organizations, which manage and operate a knowledge management project/program and/or knowledge management system(s).

Logic linking data to propositions, and criteria for interpreting the findings

The logic linking data to propositions and the criteria for interpreting the findings are components of case study research design that are, according to Yin (1994), the least well developed. Together, they represent the data analysis steps in case study research.

As for the logic linking data to propositions, this study is to analyzes results concerning influence factors that act as barriers to KM across the military organizations. These findings will then be compared to the existing influence framework that represents the influences found in the private sector. This analysis will help determine the accuracy of the initial proposition that the nature of influences on KM and the subsequent barriers these influences may provide to KM in the military may be different than those found in the private sector.

As for the criteria for interpreting the findings, this study employs multiple methods of data collection. According to Benbasat, Goldstein, and Mead (1987, p. 374), "The analysis of case data depends heavily on the integrative powers of the researcher." Triangulation between multiple data sources (interviews, documents, archival records, knowledge management system demonstrations, etc.) will lend greater support to the conclusions. The basic criteria for interpreting the findings will be: "Are new or previously established influences on KM identified?" and "Are those influences perceived as barriers to KM project implementation?"

Conduct of Research

The previous section dealt with the design considerations of this research, and this section focuses on the conduct of the actual research itself. The following paragraphs outline the research approach. Although the phases of the research are reported linearly, the very nature of case study research is iterative. Many of elements of this research were changed, altered, and changed again as more and more was known about the subject being researched.

Phase I: Theory Development

Yin (1994) states that covering the five components of case study research designs forces a researcher to begin constructing a preliminary theory related to the topic of study. Theory development, however, takes time and can be difficult (Eisenhardt, 1989). Also, "in qualitative research the use of theory is less clear than quantitative designs research" (Creswell, 1994. p. 93). The term used for "theory" varies with the type of research design. For case studies, Lincoln and Guba (1985) use the term "pattern theories." Neuman (1991, as cited in Creswell 1994) states:

> Pattern theory does not emphasize logical deductive reasoning. Like causal theory, it contains an interconnected set of concepts and relationships, but it does not require causal statements. Instead pattern theory uses metaphors or analogies so that relationship "makes sense." Pattern theories are systems of ideas that inform. (p. 94)

Although Creswell (1994) recommends placing theory late in a study, Yin (1994) sees that it is essential in the beginning as well. Yin (1994, p. 30) states that "theory

development does not only facilitate the data collection phase…[but is] also the level at which the generalization of the case study results will occur." The following paragraphs describe the actions that were taken to further develop the theory underlying the initial portion of this research.

Inductive Mode of Research/Analytic Generalization

According to Creswell (1994, p. 94-95), "In a qualitative study, one does not begin with a theory to test or verify. Instead, consistent with the inductive model of thinking, a theory may emerge during the data collection and analysis phase of the research or be used relatively late in the research process as a basis for comparison of other theories." For this particular research effort, an existing theoretical framework—the Holsapple and Joshi KM influences framework (2000; 2002)—provided an excellent foundation for "analytic generalization" (Yin, 1994 p. 31), but did not drive theory development. This approach is consistent with Lather's (1986) qualification of the use of theory, which states:

> Building empirically grounded theory requires a reciprocal relationship
> between data and theory. Data must be allowed to generate propositions
> in a dialectical manner that permits use of *a priori* theoretical frameworks,
> but which keeps a particular framework from becoming the container into
> which the data must be poured (p. 267).

Initial Expert Interviews

Prior to any decision regarding research direction, initial interviews were conducted with experts involved with knowledge management in the U.S. military. The primary purpose of these interviews was to get both perspectives on KM in the military and possible suggestions for fruitful and beneficial (to the military) KM research topics. The expert interviews included the head of the Air Force KM program, the OASD/C3I CIO (and KM head), the CKO of the Navy, and the Chief Scientist and CKO of the Air Force Operations and Test Center. These interviews were augmented by numerous contacts made at various KM activities and conferences such as the E-Gov Conference on KM and the Navy E-Business/Knowledge fair. The interviews and impromptu contacts were primarily in the form of unstructured conversations. This approach was most appropriate given the exploratory nature of the research at this point.

Literature Review

To further refine the research direction and to aid in development of research questions, an initial literature review was conducted. In this case, the literature was "used deductively as a framework for the research questions" (Creswell, 1994, p. 22).

Use of Existing Theory

Given the results of the initial expert interviews, personal contacts, conference exposure, and the knowledge gained through the initial literature review, a general research direction was decided upon. Given the disparity between service KM approaches, KM knowledge level, and KM program maturity, the researcher decided to focus on those "situations" or "conditions" that prevented or acted as barriers to KM.

This process led to a further investigation of the literature for a framework or theory that might provide a starting point or basis for the research. Such a framework was found in Holsapple and Joshi's (2000; 2002) KM influences framework. This framework identified three categories of factors—managerial, resource, and environmental—that could potentially influence (positively or negatively) KM in organizations. Identification of this framework not only helped formulate the initial research questions, but more importantly provided a theory for comparison at the study's end.

<div align="center">*Phase II: Characteristics of the Research Design*</div>

Multiple-Case Study

According to Yin, "the choice between single-and multiple-case designs remains within the same methodological framework" (1994, p. 45). A benefit of multiple case design is that "evidence from multiple cases is often considered more compelling, and the overall study is therefore regarded as being more robust" (Herriot & Firestone, 1983, as cited by Yin, 1994, p. 45). For the purposes of this research, a multiple-case study design was chosen. A broad scope of cases was necessary to adequately cover the investigation in each of the military services as well as to address the variety of KM programs in existence. Each of the cases, however, served a "specific purpose within the overall scope of inquiry" (Yin, 1994, p. 45). Yin states that each case in a multiple-case study "must be carefully selected so that it either (a) predicts similar results (a *literal replication*) or (b) produces contrasting results for predictable reasons (a *theoretical replication*)" (1994, p. 46). Eisenhardt (1989) also adds that while cases may be chosen at random, that random selection is neither necessary nor even preferable due to the fact

that the goal of theoretical sampling is to choose cases which are likely to replicate or

extend emergent theory. For this research, a total of six case studies was selected. For

the purposes of literal replication, each of the cases selected were military organizations

identified as having an active KM program. Because all of the organizations are military,

similar results could be predicted. As for theoretical replication, or contrasting results for

predictable reasons, the cases selected were equally distributed among the services (Air

Force, Army, and Navy/Marine Corps) with each case representing an organization with

a unique organization mission (e.g. medical, test and evaluation, tactical warfighter

support, and material and systems acquisition). The difference in service approaches to

KM and the varying levels of organization acceptance and need for KM provide a solid

foundation for possible theoretical replication. The specific organizations proposed as

case study sites included:

1. Air Force Material Command, Directorate of Requirements—Wright-
   Patterson AFB, Dayton, Ohio

2. Air Force Operational Test and Evaluation Center—Kirtland AFB,
   Albuquerque, New Mexico

3. Center for Army Lessons Learned--Ft. Leavenworth, Leavenworth, Kansas

4. Army Medical Department Center and School—Ft. Sam Houston, San
   Antonio, Texas

5. Marine Corps Systems Command—Quantico Marine Corps Base, Quantico, Virginia

6. Naval Facilities Engineering Command, Washington Navy Ship Yard, Washington, D.C.

Further research design details such as information about access and research procedures involved at each of the sites will be addressed in a later portion of this methods section.

Role of the Researcher

Another important characteristic of the research design to be considered was the role of the researcher. In the words of Creswell, "Qualitative research is interpretive research. As such, the biases, values and judgement of the researcher become stated explicitly in the research report" (1994, p. 147). "Such openness is considered to be useful and positive" (Locke, Spirduso, and Silverman, 1987, as cited in Creswell, 1994, p. 147). My perceptions of the military and how it differs from the private sector have been shaped by 20 years of military service in the U.S. Air Force. In those years of service I have worked primarily in the fields of information management and communications and computers at various organizational levels from wing-level operational units to major command headquarters. In those years, not only have I been exposed to the evolution of information systems technology and policy, but I have also witnessed the drastic changes in the service as a result of the end of the Cold War. The most serious of these changes has been budgetary cuts, which subsequently resulted in severe personnel and equipment drawdowns. These drawdowns continued even though our services became increasingly involved and "strung out" in military operations other

than war (e.g. humanitarian relief efforts and peacekeeping) around the globe. As a witness to the power of information systems and with a personal view of the "brain drain" problem facing the Air Force and other military services, I find that this research into the emerging field of knowledge management is a natural "next step." I bring knowledge of the structure and operation of the military as well as the knowledge of the unbounded potential and necessity of knowledge management programs and systems for the future success of the military services.

Because of my military service, I also bring certain biases to this study. Although I will make all attempts to be objective, these views will most certainly affect the way I view and interpret both the data I collect and my research experiences. I begin this study with a view that the military organization is in many ways a very different organization than those in the private sector due primarily to the nature of its mission and culture. My lack of in-depth exposure to private sector organizations may have unnecessarily inflated this view. I also believe that all military services must pursue knowledge management in some way, shape or form if they are to continue to be successful in the Knowledge Age. Finally, I perceive that there are certain influence factors that act as barriers to KM in the military that are unlike those found in the private sector.

After completing considerations for the study research design, the next major emphasis was research design quality. The following section discusses research design quality considerations in context of this research.

Phase III: Case Study Research Design Quality

Because a research design is supposed to represent a logical set of statements, its

quality can be judged according to certain logical tests (Yin, 1994). Many tests have

been offered, but four are common to all social science methods and are summarized here

by Kidder and Judd (1986). The four basic tests include:

- *Construct validity*: establishing correct operational measures for the concepts

  being studied

- *Internal validity* (for explanatory or casual studies only, and not for

  descriptive or exploratory studies): establishing a casual relationship, whereby

  certain conditions are shown to lead to other conditions, as distinguished from

  spurious relationships

- *External validity*: establishing the domain to which a study's findings can be

  generalized

- *Reliability*: demonstrating that the operations of a study—such as the data

  collection procedures can be repeated, with the same results

In an effort to incorporate these quality tests (except internal validity because this

is an exploratory study) into the research design the following considerations

were made.

Construct Validity

In considering construct validity for this case study research, three primary

tactics were incorporated. First of all, multiple sources of data were collected. The

sources of data included semi-structured interviews, archival records, field notes, and

organization documents. Triangulation was used to establish convergence of these multiple sources of data and to provide "stronger substantiation of constructs and hypotheses" (Eisenhardt, 1989, p. 538). The second tactic incorporated was the creation of a case study database (Yin, 1994) separate from the case study report itself. The database was created by cataloging each of the electronic case study transcripts into case folders. A paper copy of each transcript was then broken down by categorizing respondent comments into the three influence categories. Researcher notes were annotated within each transcript to indicate the relationship between the comment and influence type assigned. The third and final tactic included having all respondents review/approve their interview transcripts and having key respondents review/approve a draft of the case study report. The intent of these tactics were to provide a cross-check of findings and conclusions.

External Validity

External validity addresses whether a study's findings are generalizable beyond the immediate case study. Because this study used a multiple-case study design, the use of replication logic was the vehicle for establishing external validity. The fact that each case study was a military organization with an active KM program allowed the use of replication logic across cases.

Reliability

Reliability is not as easy to demonstrate in case study research as it is in some other research designs. Proof of reliability in this research effort was to stem from a very clear delineation of the research approach and steps followed. The intent was to

accomplish the research (i.e. collect, analyze, and store the data) in such an explicit manner that the procedures could be repeated with the same end result.

The previous paragraphs have described the general approach to these issues for this particular study. Undoubtedly, research design quality considerations are key to good research. A more in-depth explanation and direct application of these research design quality considerations will be discussed in the next major section.

Limitation

Before moving on, one serious limitation to this study must be noted—the lack of multiple researchers. A variety of works on case study research (e.g. Eisenhardt, 1989; Benbasat, et al 1987; Yin, 1994) have noted that the use of multiple investigators enhances case study research. Eisenhardt (1989) states that the use of multiple investigators not only enhances the creative potential of any study, but, also enhances confidence in the findings as a result of convergence between investigators. This research involves only a single investigator.

<div align="center">*Phase IV: Conduct of Research*</div>

Pilot Study

According to Yin, a "pilot case study helps investigators to refine their data collection plans with respect to both the content of the data and the procedures to be followed" (1994, p. 74). It also helps the investigator develop relevant questions and provides a cross-check for the proposed research design. For this research, the pilot case was selected for reasons of access, convenience, and the willingness of the participants. The nature of the pilot inquiry (Yin, 1994) was very broad and exploratory. Although an

initial set of questions was used to promote flow of the open-ended interviews, the

conversations, in some cases, veered in unexpected directions covering additional and

unplanned topic areas. Additional interviews were also conducted at the suggestion of

the organization KM program leader. Surprisingly, interested volunteers asked to be

interviewed as well. Using a combination of the data collected via the interviews and on-

site observation of the knowledge management systems being developed and in use, the

viability of the research topic was proven and the research questions and research design

were altered and refined. A final report of the pilot study, in the form of a teaching case,

was completed and proved instrumental in refining the data collection plan and

establishing additional data collection needs.

Coordination for Case Study Sites

The coordination for case study sites was completed in conjunction with the

service CKOs (or equivalents). Each service CKO—Mr. Bao Nguyen, U.S. Air Force;

Ms. Miriam Browning, U.S. Army; and Ms. Alex Bennet, U.S. Navy/Marine Corps gave

explicit permission for conduct of the research and made general recommendations

regarding potentially appropriate case study sites/organizations. Each gave their

additional approval for the researcher to coordinate further specific arrangements with the

selected case study organization KM leaders directly.

Once a preliminary list of case study sites were selected, the organization KM

leaders were contacted, were provided the necessary background information and

research requirements, and were asked to participate in the study. Upon approval, further

arrangements regarding research dates, interviewee contacts, and research procedures

were discussed. These actions were completed in compliance with the Auburn

University Human Subjects Office Institutional Review requirements, which will be

discussed next.

Institutional Review Board

The primary purpose of the Institutional Review Board (IRB) is to ensure the

safety and protection of potential research subjects. In addition to the IRB, the researcher

must also address the importance of ethical considerations (Creswell, 1994). In

accordance with IRB guidelines, the following safeguards were used to protect the

interviewee's rights: 1) the research objectives were stated verbally and in writing so that

they could be clearly understood by the participant (this explanation included a

description of how the data would be used), 2) written permission to proceed with the

study was required from the participant, 3) written consent to "quote" was required for

non-anonymous data, 4) the participant was informed of all data collection devices and

procedures, 5) verbatim transcriptions and written reports were made available to the

participants, and 6) the research protocol form was filed and approved by the IRB (IRB

Authorization #01-185 MR 0201).

Data Collection Planning

According to Yin (1994), any protocol for data collection should include the

following:

- An overview of the case study project (project objectives, case study issues, and relevant readings about the topic being investigated)

- Field procedures (credentials and access to the case study sites, general sources of information, and procedural reminders)

- Case study questions (the specific questions that the cases study investigator must keep in mind in collecting data and potential sources of information for answering each question)

- A guide for the case study report (outline, format for the narrative, etc.)

In designing the protocol for this research, each of these considerations was made. The overview of the case, the initial expert interviews, in-depth literature review, and pilot study helped to bound the study and clarify specific research objectives. General field procedures were initially developed in preparation for the IRB review. These procedures addressed the specific steps for making contact with the case study organizations, organizing meeting dates and times, interviewee selection and interview procedures, and data collection, use, and release criteria. These field procedures were refined further after the pilot study and as additional cases were studied. The case study questions were iteratively refined during the preparation for research and after the pilot study. Specific consideration was given to the potential sources of information. In addition to the responses obtained from the interviewees, data necessary to profile each organization was obtained. The data collection plan included an in-depth search of appropriate Internet sites and library/case study organization sources prior to each case study appointment. This process allowed the researcher to both familiarize herself with the organization before arriving as well as pinpoint the remaining data still to be collected. Finally, the format for the final case study report was contemplated in order that the data collection

incorporated all necessary items. It was determined that the case study reports would include the following sections: organization profile (i.e., history, mission, organization structure), knowledge management program profile (i.e., KM program vision/purpose, KM systems, KM personnel and roles), analysis of managerial influence factors, analysis of resource influence factors, and analysis of environmental influence factors.

Data Collection Techniques

The use of multiple sources of evidence is critical to case studies. As noted previously, the sources for data collection in this research included interviews, field notes, documents, and archival records.

The use of open-ended interviews provided the core data for this research. According to Yin (1994), open-ended interviews allow interviewers to ask respondents (or informants) about matters of fact as well opinions and insights. With the interviewees' permission, each session was taped in order to better capture the data for future evaluation. Taping the sessions also promoted a smoother interview flow as the researcher did not have to interrupt or ask the interviewee to repeat something previously said. The use of the open-ended interview also promoted a broader data capture by allowing the respondent to address specific questions while also giving them the flexibility to address other issues as they felt necessary. Responses outside the basic research questions helped to refine existing questions, formulate new questions, and develop new propositions for research. After taping the interviews, each was transcribed and returned to the individual for review and approval for use.

Another source of data came from field notes of the researcher. Eisenhardt

describes field notes as a "running commentary to oneself and/or research team" (1989,

p. 538). An important adjunct to the interview tapes, the field notes captured the

researcher's impressions about the interviews and observations of individual and

organization dynamics. The field notes helped capture on-the-fly facets of observation as

well as analysis. The use of field notes also helped in overlapping data analysis with data

collection. In the words of Eisenhardt, "Overlapping data analysis with data collection

not only gives the researcher a head start in analysis but, more importantly, allows

researchers to take advantage of flexible data collection" (1989, p. 539).

Another importance source of data included published documents, websites, and

archival records. The published documents included internal documents, published

reports, and advertising/public affairs information. Archival records included primarily

organization charts, budget records, personnel lists, etc. Many of these published

documents/archival records were obtained prior to the case study appointment while

some were obtained during and even after the formal interviews were complete. Much of

the document-based data/information and website information helped to form the basis of

the organization and knowledge management program profiles.

Data Analysis Strategies

Analysis of case study data is one of the least developed and most difficult aspects

of doing case studies (Yin, 1994). "Unlike statistical analysis, there are few fixed

formulas or cookbook recipes to guide the novice" (Yin, 1994, p. 102). In light of the

challenges associated with case study data analysis, the first step was to choose a general

strategy. The general strategy chosen focused on "relying on theoretical propositions"

(Yin, 1994, p. 103). This strategy is based on following the theoretical propositions that

led to the case study. Given the previously established approach to this research and the

fact that Holsapple and Joshi's influences framework was to establish the initial

propositions, this strategy made sense and fit well.

The general strategy was accomplished by using a specific analytic technique

called pattern matching. Pattern matching logic "compares an empirically based pattern

with a predicted one (or with several alternative predictions)" (Trochim, 1989, as cited in

Yin 1994, p. 106). This pattern matching logic was applied in within-case analysis as

well as with cross-case analysis. Although some data analysis began during the research

through the use of field notes and the pilot study, much of the analysis was done after the

actual case study site visits and data collection.

Eisenhardt states that the "importance of within-case analysis is driven by one of

the realities of case study research—a staggering volume of data" (1989, p. 540).

Within-case analysis can help researchers deal with the overwhelming amount of data by

requiring them to become intimately familiar with each case. The method selected for

conducting the within-case analysis in this research effort involved the preparation of

transcripts for each interview and a subsequent breakdown of those transcripts. More

specifically, each transcript was captured electronically in a text file. The electronic text

files for each interview were then printed and the comments broken down and

categorized according to the influence (and other miscellaneous) categories. At the

completion of the process, each interview transcript had been reviewed line by line and

groupings of like comments were compiled into the various influence categories and other consistent themes. In this manner, unique patterns from each case emerged. This interview data was then combined with the remaining paper-based documents, website information, etc. to form a robust understanding of each case as a stand-alone entity.

Conducting the within-case analysis enhanced the subsequent cross-case analysis. The primary purpose of cross-case analysis is to counteract the fact that humans are poor processors of information (Eisenhardt, 1989). Because of this fact, they often leap to conclusions, are swayed by certain aspects of data, or allow their personal paradigms to blind them to contradictory evidence. Cross-case analysis can help to counteract these information-processing biases by looking at the data in many different ways. The analysis tactic used to conduct cross-case analysis in this research involved a procedure of selecting categories and then looking for within-group similarities coupled with intergroup differences. A similar procedure is described by Eisenhardt (1989) and Bourgeois and Eisenhardt (1988). In this research, the categories for comparison were developed in alignment with the three previously identified influence categories established by Holsapple and Joshi (2000; 2002). Because all of the cases were military organizations, investigation of responses that fit into these three categories across the cases allowed an excellent opportunity for within-group comparison. Pairing of similar service case studies (two each) was also accomplished to establish both similarities between pairs and any intergroup differences. Finally, due to the varying mission-orientation of each case study organization, each case was studied independently and

compared to every other case in order to, again, identify any existing intergroup differences.

Use of within-case and cross-case analysis required the researcher to view the same data in very different ways. The structure and diverse nature of these tactics improve the likelihood of accurate and reliable theory (Eisenhardt, 1989).

Conclusion

This chapter discussed the research design and methods for this study. The chapter began with an introduction and a discussion of the state of knowledge management research and established its close association with IS research. The chapter also addressed the specific considerations for choice of a qualitative versus quantitative research approach and then discussed the choice of a case study design. The final sections of the chapter addressed the specifics of the data collection plan and data analysis approach. Chapter Four will discuss the results of the data collection efforts.

CHAPTER FOUR—AIR FORCE MATERIAL COMMAND[2]

Organization and KM Program Profile

Organization Structure and Mission

Air Force Materiel Command (AFMC) is one of the Air Forces' nine major commands
(Figure 5). It employs approximately 90,000 highly professional and skilled military and
civilian employees across the United States. The primary mission of AFMC is to
"develop, acquire, and sustain the aerospace power needed to defend the United States
and its interests ... today and tomorrow." This mission and its corresponding objectives
give AFMC "cradle-to-grave" oversight for the force's aircraft, missiles, and munitions.
Its nine top-level mission essential tasks and objectives are described in Table 5.

HQ USAF	
Air Force Special Operations Command AFSOC	Air Combat Command ACC
Air Education & Training Command AETC	Air Mobility Command AMC
U. S. Air Forces Europe USAFE	Air Force Reserve Command AFRC
Air Force Space Command AFSPC	Pacific Air Forces Command PACAF
Air Force Material Command AFMC	
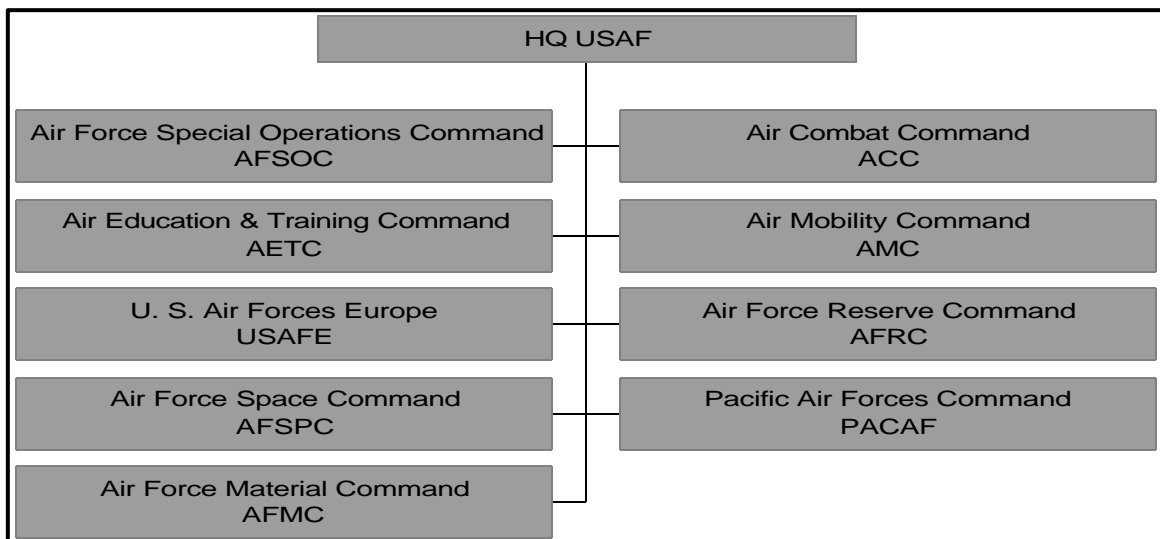
Figure 5. U.S. Air Force Major Commands

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[2] Information for this case, except where stated otherwise, is based on interviews conducted October 2-4,
2001, at AFMC.

Table 5. Mission Essential Tasks and Objectives

Tasks	Objectives
Product Support	To provide world class products and services, delivering dominant aerospace systems and superior life cycle management.
Information Services	To develop, acquire, integrate, implement, protect and sustain combat support information systems for the USAF and DoD customers.
Supply Management	To provide and deliver repairable and consumable items (right product – right place – right time -- right price).
Depot Maintenance	To repair systems and spare parts that ensure readiness in peacetime and provide sustainment to combat forces in wartime.
Science and Technology	To develop, demonstrate and transition affordable advanced technologies to achieve Air Force Core Competencies.
Test and Evaluation	To provide timely, accurate and affordable knowledge and resources to support weapons and systems research, development and employment.
Information Management	To provide secure, reliable, interoperable communication and information services/access any time, anywhere, to AFMC customers, partners and employees.
Installations and Support	To provide base support services, property management and environmental protection at AFMC installations.
Combat Support	To provide the trained and equipped expeditionary combat support forces and capabilities to meet worldwide taskings.

AFMC fulfills its responsibilities through a series of product centers, research laboratories, test centers, air logistic centers for maintenance, and specialized centers (Figure 6). Weapon
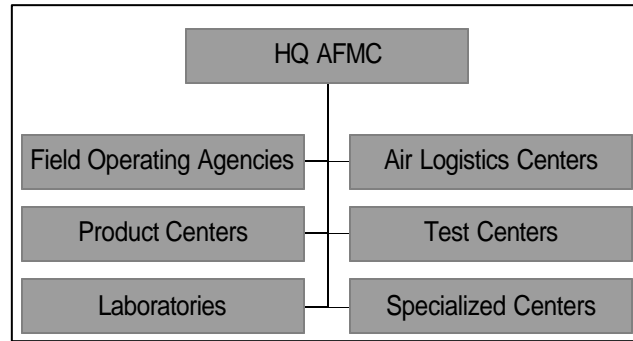
Figure 6. Air Force Material Command

systems, such as aircraft and missiles, are developed and acquired through four product centers, using science and technology from the research laboratories. These weapon systems are then tested at AFMC's two test centers and are serviced and repaired at its three air logistics maintenance depots. The command's specialized centers perform various other development and logistics functions. Eventually, aircraft and missiles are

"retired" to its Aircraft Maintenance and Regeneration Center at Davis-Monthan AFB, Arizona.

AFMC KM Program "Home"

AFMC's central governing organization, Headquarters (HQ) AFMC (Figure 7), consists of all the functional areas that provide support for command organizations. The Directorate of Requirements (DR) is the command's focal point for policies, processes, and resources that support the product mission. The Directorate of Requirements, Acquisition and Support Division (DRA), is the home of AFMC's KM program.

History

In the early 1990s, the U.S. Department of Defense recognized the need to streamline its acquisition process. As a result, the Air Force created a System Program Office (SPO) in the Aeronautical Systems Center to develop technology solutions to that end. The resulting Air Force Acquisition Model included an on-line repository of all acquisition regulations, step-by-step processes for conducting acquisitions, and miscellaneous help information such as points of contact and lessons learned. Although the technology used was immature, this digital repository was a first of its kind in the military and was quickly copied by the other services.

After its initial success, the SPO proposed its idea to the Office of the Under Secretary of Defense for Acquisition Technology for possible use across the DoD. The proposal was approved in 1998, and became known as the Defense Acquisition Deskbook program. As a DoD-level project, the program was managed and developed by an inter-service Joint Program Office.

HQ AFMC Command Section			
CE Civil Engineer	DO Operations	ST Science and Technology	LG Logistics
EN Engineering	PA Public Affairs	XP Plans and Programs	FM Comptroller
PK Contracting	HC Chaplin	SC Communications and Information	DP Personnel
HO Historian	SE Safety	SF Security Forces	IG Inspector General
DR Requirements	SG Surgeon General	JA Staff Judge Advocate	IN Intelligence

Figure 7. HQ AFMC Organization and Directorates

Major Deskbook program activities were transferred into the Joint Program Office and AFMC/DR was assigned the remaining task of keeping the Air Force's Deskbook documents updated and current. Of approximately 1,500 AF documents in the Deskbook, AFMC/DR retained responsibility for the 1,300 documents owned by AFMC. The small group of AFMC personnel who were initially transferred to the Joint Program Office later returned to AFMC/DR. Although no longer physically present in the Joint Program Office, the Deskbook team submitted their updates to the Joint Program Office electronically. Although the Joint Program Office retained oversight responsibility for the Deskbook program, the funding stream continued for AFMC/DR. Of its $1.5 million budget, only $500,000 was committed to Deskbook. AFMC/DR was faced with the question of what to do with the excess funds.

The answer came as a result of an Air Force Inspection Agency study that identified the need for an overarching lessons learned program for the AF. While the need was AF-wide, the AFMC/DR Deskbook Team decided to use its expertise and excess funding from the Deskbook program to address the problem. As a result, it produced a formal requirement to develop an Air Force Lessons Learned Pilot Program. Based on the AFMC Deskbook concept and expertise, the team was able to add additional capabilities to capture and make available lessons learned information.

From their research on how best to design the new system, the team adopted the new term "knowledge management," which described the purpose behind the Deskbook and Lessons Learned projects. The team saw knowledge management as enhancing organizational performance by explicitly designing and implementing tools, processes, systems, structures, and cultures to improve the creation, sharing, and use of knowledge that was critical for decision-making. The team felt the goals of knowledge management and the goals of the Deskbook/Lessons Learned projects were consistent. They also realized that by putting their efforts under the knowledge management umbrella, AFMC/DR could add credence to its efforts. From that point forward, the AFMC/DR team approached their projects and proposals from a KM perspective.   In addition to the Deskbook/Lessons Learned efforts, AFMC/DR also developed Web-based training to educate the acquisition workforce in lieu of sending them to classroom training.

AFMC KM Vision

Given that there was no existing AF-level KM vision or strategy, AFMC had to develop its own. As such, AFMC's vision for knowledge management was to implement

commercial knowledge management techniques and processes that would allow

knowledge gained from the past to be applied to current and future projects, programs,

and systems. What was originally known as the Air Force Knowledge Management[3]

(AFKM) program was aimed at applying commercial KM processes to solve specific

business problems through the sharing of information. The AFMC/DR definition of

knowledge management was "the strategies and processes of identifying, capturing, and

leveraging knowledge and expertise within an organization." To serve its purpose,

knowledge management had to allow the user to take advantage of information

technology solutions while creating a supportive, collaborative, and information and

knowledge-sharing culture.

AFMC KM Systems

Technology is a key enabler of organization knowledge management (O'Dell et

al., 1998; Davenport and Prusak, 1998; Alavi and Leidner 1999 and 2001, et al). A

separate class of information systems, referred to as knowledge management systems,

enable a majority of organizational knowledge sharing and transfer efforts. This is

certainly the case in AFMC. By mid-2000, AFMC/DRA was maintaining four KM

systems--the AFKM Lessons Learned database, the AFMC portion of the DoD

Acquisition Deskbook, the AFKM Help Center, and the AFMC Virtual Schoolhouse.

Each of these separate Web-based systems contributed to Air Force Knowledge

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[3] The AFKM program and the AFKM system, consisting of the Deskbook and Lessons Learned, were originally conceived to serve the entire AF. At that time there were no other existing KM initiatives in the AF and no top-level KM policy/program office. Although the AFKM program was headed by HQ AFMC and served, for the most part, AFMC customers, there was no controversy about its name (AFKM vs.

Management and had evolved in response to new information/knowledge needs of the AF acquisition workforce. In order to meet the AF strategic business objectives, information and knowledge had to be more quickly and easily available to each individual in a manner that related to that individual's job responsibilities.

As of August 2001, the AFKM website (Figure 8) described its basic functions as follows:

> Air Force Knowledge Management (AFKM) is the place to go to find out what you need and to share what you know.…[This website] applies commercial KM concepts and technologies to address Air Force business problems. It includes: collaborative workspaces for communities of practice (CoP), high-value Internet links, Internet-based learning technology to provide training via the Web, and a repository of lessons learned, best practices, and other bits of usable knowledge. The objective is to make our jobs easier and to enhance job performance by integrating organizational lessons learned, community wisdom, training and collaborative technology to support current and future projects.

AFMC KM). Now that an AF-level KM policy office is evolving, however, there is contention that the name AFKM is misleading and should be changed to AFMC KM to correctly identify its owner.

Figure 8. Air Force Knowledge Management (AFKM) Home Page

AFKM System Components

The AFKM system uses the Internet as its backbone and a central website as its

portal. The central website is the AFKM Hub (or AFKM home page) which includes

access to Lessons Learned, Deskbook, AFMC Help Center, Virtual Schoolhouse, and

Community of Practice (CoP) workspaces (Figure 9). The Hub evolved from the

original Lessons Learned website. It now acts as a portal to a range of knowledge

sharing resources. In general, the Deskbook component provides a variety of documents

describing the laws, directives, policies, and regulations related to Department of Defense

acquisitions. The Help Desk component provides an English language search engine for

both AFMC and other miscellaneous customers to find documents anywhere on AFMC

websites. The Virtual Schoolhouse component delivers over 20 on-line courses for Air

Force acquisition training. Finally, the CoP workspaces allow for information exchange,

cooperative activities, and problem solving. The specific functions of each of these

website components is described in more detail below.
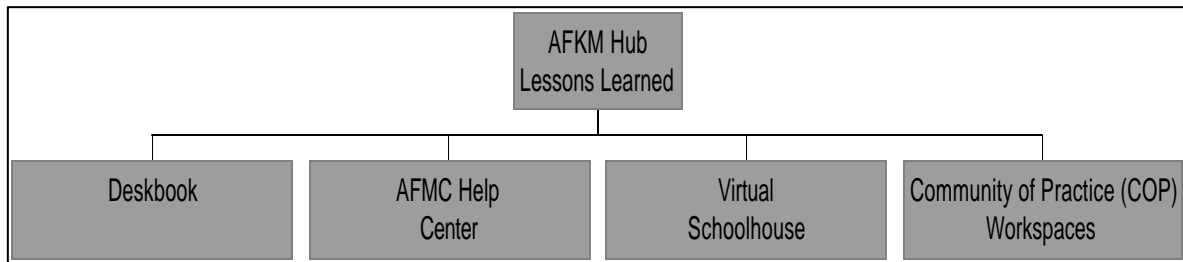
Figure 9. AFKM System Components

AFKM Hub

What is now the AFKM Hub, was originally the primary website for the AF

Lessons Learned utility. Although the website has evolved, the Lessons Learned still

serve as the centerpiece of the Hub (Figure 10). Lessons Learned have been captured and

categorized by subject area and provide valuable knowledge about past processes and

events to any customer who might need them. The AFKM Hub also acts as a portal for

all other AFKM components and, as such, it serves as the default AFKM home page.

The AFKM Hub provides a conduit to select relevant knowledge resources and provides

an avenue for creating a knowledge-sharing organization.
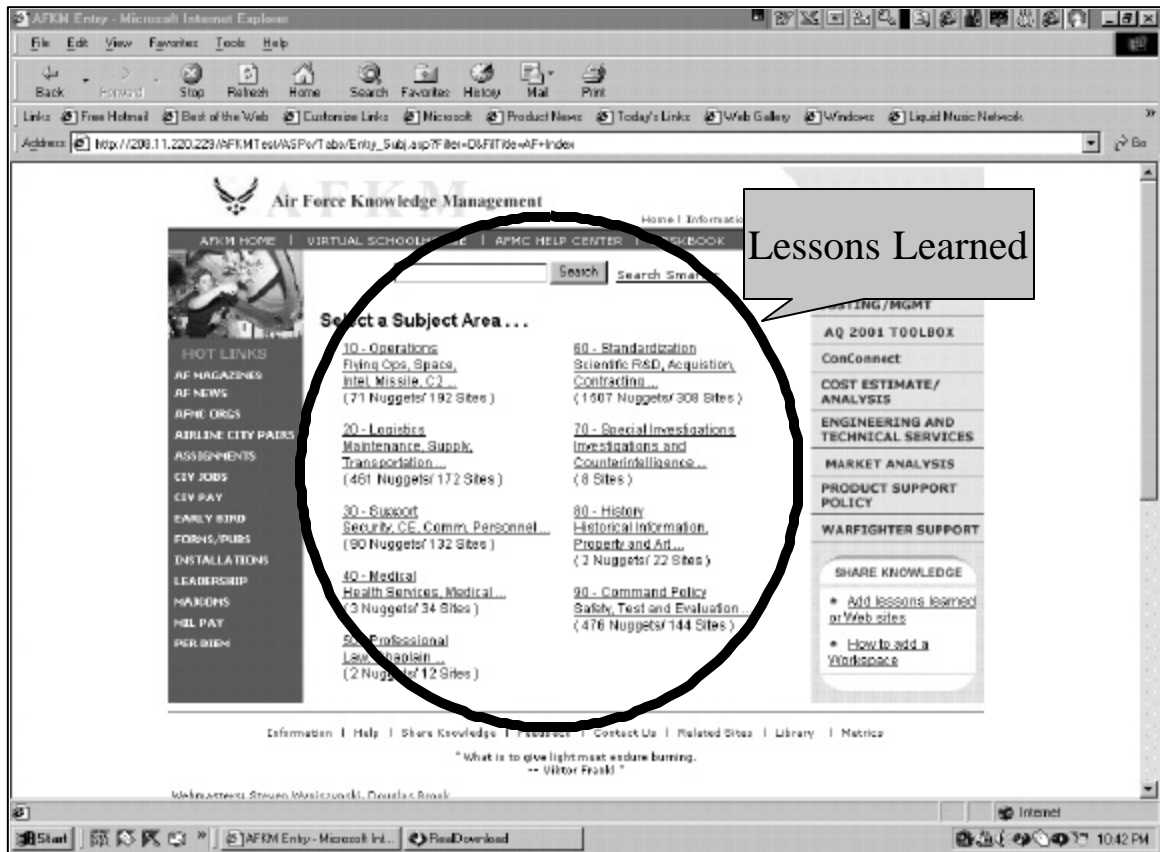
Figure 10. AFKM Lessons Learned Component

Deskbook

The Defense Acquisition Deskbook (Figure 11) is an automated reference tool that provides the most current acquisition information for all DoD Services and Agencies. Deskbook simplifies the acquisition process by maintaining a single source of up-to-date reference material on acquisition policy and practices.

Figure 11. Defense Acquisition Deskbook Component

AFMC Help Center

The AFMC Help Center (Figure 12) allows AFMC customers to perform a natural language or keyword search of over 130 AFMC websites and selected databases. It connects AFMC customers throughout the Air Force and DoD with the appropriate AFMC information source or point of contact. The search engine used dynamically creates a unique results page separated into four categories:

- ranked list of related web documents and links

- top priority Major Command issues

- bulletin board discussion entries

- contact information for the AFMC command liaisons and topic area points of contact
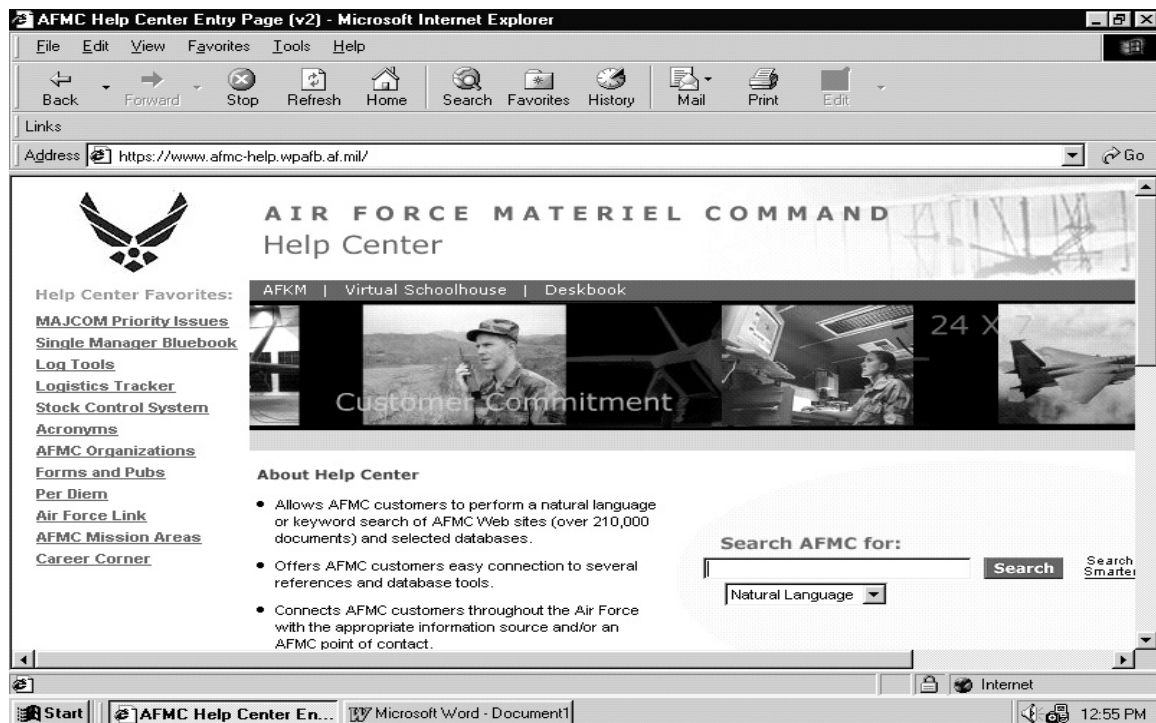
Figure 12. AFMC Help Center Component

Virtual Schoolhouse

The Virtual Schoolhouse (Figure 13) is a cooperative effort between

AFMC/DRA and the Air Force Institute of Technology (AFIT). The Virtual

Schoolhouse provides an integrated web-based learning management system with over 20

on-line courses. Its purpose is to support the goal of a fully trained Air Force acquisition

workforce.
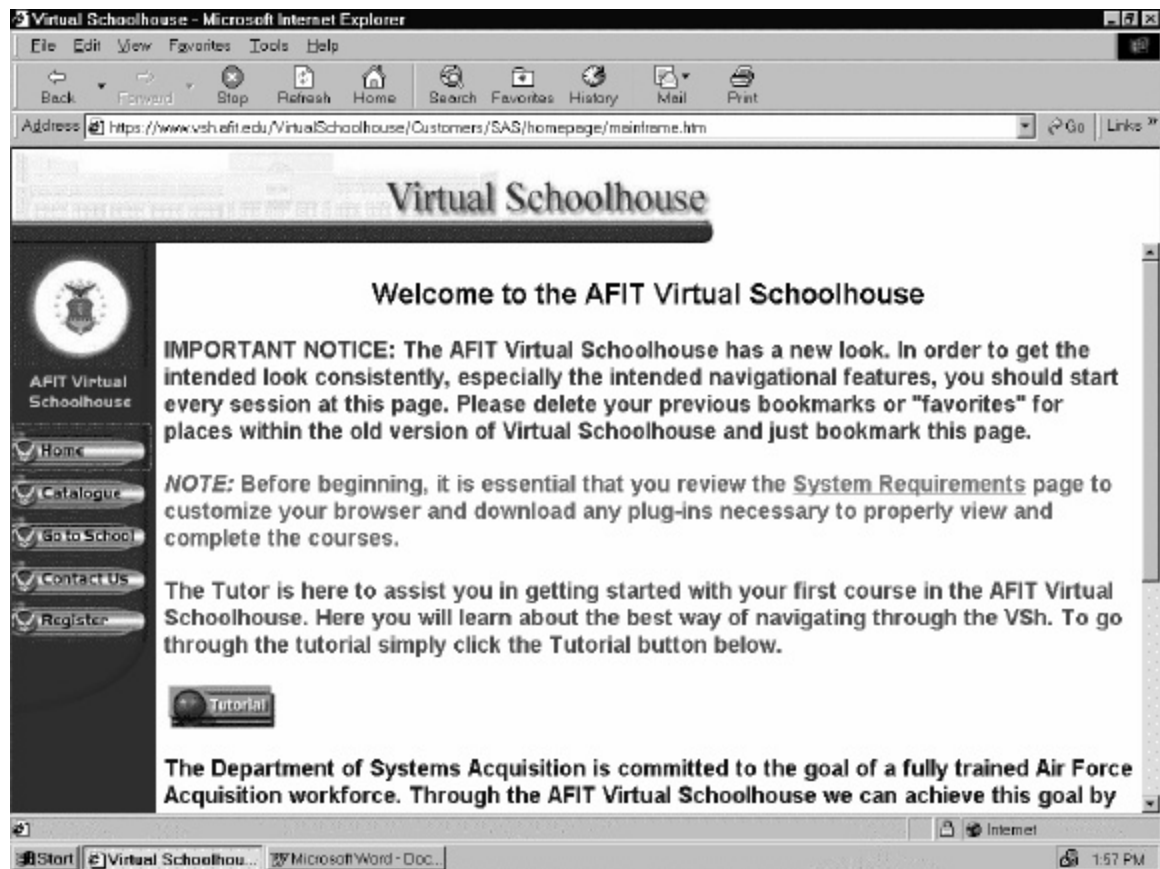
Figure 13. Virtual Schoolhouse Component

CoP Workspaces

A community of practice (CoP) is defined as a network of people who share a common mission. CoP workspaces are virtual environments where members of these CoPs can exchange information to complete work tasks and solve problems. Each CoP serves a specific customer set. The AFKM Hub provides CoP workspaces (Figure 14) for the following CoPs (Table 6).

Table 6. Community of Practice Workspaces

Community of Practice (CoP) Name	Description
Acquisition 2001 Toolbox	This workspace is a clearinghouse for acquisition tools, resources, sites, and related subjects. Personnel can also find links for career development, policies, contracting and acquisition reform, as well as related activities and information of general interest to government, military and industry.
Activity-Based Costing/Management	This CoP provides activity-based costing links and resources.
ConConnect	A workspace that provides contract vehicle information for organizations seeking a fast-track method of procuring goods and/or services.
Engineering and Technical Services (ETS)	This CoP provides for the capturing and sharing of engineering and technical services information submitted by 450 ETS specialists worldwide.

Table 6. (cont)

Fleet Assessment	A workspace that allows the fleet assessment community to work the process of information gathering and data collection to evaluate weapon system operational capability and the ability of the logistics support system s to support weapon systems operations.
Market Analysis:	This workspace provides a gateway to information, resources, and tools designed to assist acquisition teams across AFMC pursue commercial acquisitions, develop price-based acquisition strategies, and prepare market research reports.
Warfighter Support:	A workspace that provides the AFMC Commander and command decision-makers one-click access to readiness and logistics support information on AFMC-managed weapon systems.
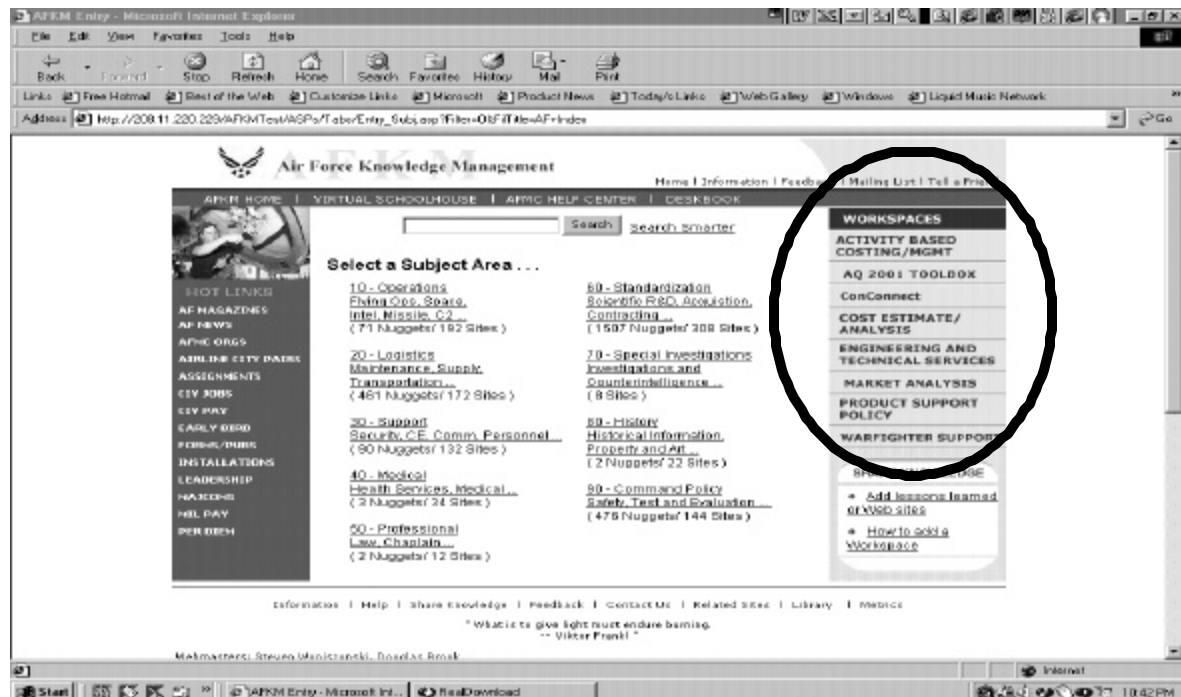
Figure 14. Community of Practice Workspaces

AFMC KM Program Team

Throughout the history of the AFKM program, contractors have always played a key role. Although final authority has always been vested in a military officer or civil service employee assigned to AFMC/DR, most of the software programming and systems technology was designed and/or built by contractors. In the beginning, the primary contractor for the Deskbook development was I. M. Systems Group (IMSG). Over time and as additional projects were added, Triune, and Fenwick Technologies Inc., joined the team. The specific responsibilities and tasks varied from year to year as projects evolved and as the contracts were renewed and renegotiated. Each contractor used a number of personnel to work on projects—some personnel worked on AFKM projects exclusively while others came in and out of the projects as necessary.

In late 1999, as the complexity of the KM projects increased, the program manager, Randy Adkins, realized that Triune, the original contract lead team, lacked the expertise to accomplish the tasks that he and his superiors desired. As a result, he made an unpopular, but necessary, decision to replace this contractor with Northrop Grumman TASC[4] (then owned by Litton). TASC, with more than 5,000 employees nationwide, had successfully completed other government KM projects since 1997. In contracting TASC to establish the AFKM program, Adkins had justified his decision:

> "…we find TASC provides unique benefits to the government and is the
>
> best value for the technical services required. TASC rates are competitive

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[4] TASC originally stood for The Applied Sciences Corporation. Now the name is only used in its shortened form.

with the other contractors reviewed; TASC is a highly regarded supporter

of knowledge management at the Office of the Secretary of Defense level;

TASC is the developer of the AFKM Virtual Schoolhouse; and TASC has

proven integration expertise. In addition, TASC rated extremely high in

the area of customer service and past performance."

As of mid-2001, with TASC as the lead contractor, 41 personnel were assigned to

the AFMC KM project team. A $600,000 budget cut in late 2001 required a reduction of

6 personnel for a final total of 35. The resulting AFMC KM program organization is

shown in Figure 15. TASC was charged with establishing a consolidated AFMC KM

system (still referred to as AFKM) by bringing together the existing AFKM Lessons

Learned database, AFMC Help Center, and Virtual Schoolhouse. Most of the KM

project team's work was split between maintaining and updating existing functions and

developing new applications. A majority of the new applications focused on building

workspaces for CoPs.

Figure 15. AFMC KM Program Team

Findings on Influence Factors that Act as Barriers to KM in AFMC

Having profiled the AFMC KM organization and KM program team and system

attributes, the study now focuses on the influence factors that act as barriers to KM in

military organizations. The framework for this research comes from Holsapple and Joshi

(2000; 2002) and categorizes KM influence factors into three main categories—

managerial, resource, and environmental. Each of these influence categories has been

investigated as they apply to AFMC. The results are presented below.

Managerial Influence Factors

The purpose of the first research question was to identify managerial influence

factors that act as barriers to organization knowledge management. Using the influences

framework as a template for discussion, the following managerial influence factors will

be discussed: leadership, coordination, control, and measurement. The findings will then

be discussed in the general order the questions were posed.

Leadership Factors

Lack of leadership commitment. The impact of diminished leadership support for

KM had become evident with the Deputy Director of AFMC/DR's (Mr. Mulcahy)

departure. In February 2000, Mr. David Franke was appointed new Deputy Director of

AFMC/DR. Major General Michael Wiedemer had also become the new Director of

Requirements. Both were very open to knowledge management concepts and the AFMC

KM Program, but neither was as informed or excited about knowledge management as

the previous director had been. Franke, to whom Adkins primarily reported, was not sure

that knowledge management should be a centerpiece of AFMC strategy. Franke saw the

primary benefits of knowledge management as coming from the building "of" and participation "in" communities of practice. While encouraging Adkins and the AFMC KM project team to continue their pursuits, he did not have a firm vision for KM or AFMC KM in the future. He had stated,

> "I am [satisfied with letting the AF MC KM team's efforts grow].
> [General Weidemer] talks about knowledge management and application
> of knowledge management, but I don't see anything on the horizon.
> Knowledge management is a tool for everything else we're doing. And
> we've got so many other things going on right now with enterprise
> management and the evolution of it, and knowledge management is [just]
> in the background churning as a tool to help make these things happen."

As for committing additional resources to gear up an AFMC KM program, he had also remarked,

> "Anything is a struggle and has been for the last year, for either resources,
> dollars, [or] people. [It] doesn't make any difference what it is. And
> unless you can get a real special emphasis project, it is a difficult fight
> without a doubt."

Mr. Franke admittedly did not see knowledge management as needing emphasis above and beyond other programs. As a result, Adkins predicted that he might have increased difficulty getting the backing and exposure for knowledge management that it needed to compete with other AFMC programs for scarce resources. His prediction had come true in the form of a FY 2002 budget cut of $600,000. This budget cut caused an immediate

reduction in AFMC KM program team personnel as well as a scaling back of program objectives and contractor tasks.

Another serious leadership issue had been the inability to get AFMC KM issues raised to the AFMC Commander level. Without Mulcahy and/or other leaders actively pushing the KM philosophy or AFMC KM projects, the critical issues never got the top-level attention necessary. When asked how this had impacted his program, Adkins stated,

> "I think it's held us back some. We've never been able to get in front of
>
> General Lyles…and show him what we are doing and sell him because
>
> he's so busy….and he hasn't found this [KM] as a priority."

There were many issues that Adkins and his team struggled with everyday that could have easily been resolved at the AFMC Commander level. The inability to access the commander using proper chain of command channels, however, left Adkins and his team without necessary direction. The fact that they did not know the AFMC Commander's knowledge of, or position on, KM made it extremely difficult to plan an acceptable strategy for the future.

Lack of reinforcing behaviors. In the absence of strong KM leadership, the evidence of KM reinforcing behaviors was almost non-existent. With the exception of the AFMC program manager, some AFMC KM team members, and some CoP users, very few individuals in critical leadership capacities exhibited KM reinforcing behaviors such as mentoring, storytelling, acting as a catalyst for KM, etc. The AFMC Cultural

Needs Assessment performed by TASC also noted the lack of a formal reward system for

knowledge-sharing or collaborative behavior. Although no active intervention against

knowledge management was observed, leaders and managers were not found to be

"manipulating the organizational culture" (Schein, 1985) towards a knowledge

management or knowledge-sharing philosophy.

Coordination Factors

There were many evident coordination issues both internal and external to the

AFMC KM program. In general, these issues involved strategy alignment, responsibility

delineation, and goal and objective conflicts. Overall, the coordination issues

encountered provided profound barriers to the implementation of organization KM.

The AFKM name conflict. One of the first major coordination issues uncovered

involved use of the AFKM, instead of AFMC KM, name. When AFMC began its

Deskbook and Lessons Learned initiatives using the name AFKM, there were no other

known KM programs in the Air Force. Being first, combined with the fact that the

Lessons Learned tool was originally built for the entire Air Force, made it natural to label

the effort "AF" KM instead of "AFMC" KM. However, with KM initiatives now

popping up across the service, the "AF" KM label now seems inappropriate. A

representative from the Air Force Chief Information Officer/Business, Information

Management, Policy, and Planning Directorate, heading the AF-wide KM movement, has

insisted that the program's name be changed to avoid confusion with the AF-wide KM

program.

According to Adkins, the name change from "AFKM" to "AFMC KM" is more complicated that it appears on the surface—it has significant implications for his organization. On the positive side, Adkins described that a name change might actually be a good thing. With other KM initiatives surfacing throughout the AF and with the advent of the AF Portal, he has found that the title "AFKM" was no longer descriptive of what his team and systems are providing. His thoughts were that the AFMC KM products have to be identifiable, especially now that they will be "buried" behind the AF Portal. He used this example.

> "…And so, if I was Joe Blow out there at Ogden Air Logistics Center and I open the [AF] Portal and I happen to see this link [AFKM Hub], I wouldn't click on it…because I don't have any idea [of what it is] unless I happened to have that wonderful briefing we gave them."

Accordingly, as TASC began the task of developing an AFMC KM strategic vision and plan, the name AFMC KM began to be used as the formal name for the overall AFMC KM program. The KM system supporting the AFMC KM effort is still referred to as AFKM, but that may soon change as well.

On the negative side, Adkins knew a name change was not that simple. In addition to generating confusion among existing customers, a name change could signal a reduction in program scope and mission, which might ultimately impact funding and further endanger the KM program's viability.

Uncoordinated Evolution of AFMC and AF KM Programs

Another coordination issue involved the simultaneous evolution of the AFMC and AF KM programs. Although each of these programs continue to grow and change in their own right, there is little coordination of action between the levels of management in AFMC and/or the appropriate levels of management at the AF level.

AFMC KM evolution. When Mulcahy and Adkins had commissioned TASC to define a vision for knowledge management, it was their intent that all of AFMC, not just the AFKM system, be addressed. Although the statement of work had not been commissioned by the highest levels of AFMC management, they felt it was still appropriate given it addressed a command-wide problem—intellectual capital attrition. Sometime in the future they hoped their efforts would lead a headquarters-level knowledge management function and/or possibly the appointment of a Chief Learning Officer (CLO) for AFMC.   It only followed that the AFMC KM team would become part of that new function. By elevating the functions in the hierarchy, KM could then be addressed from a command-wide perspective. This process would allow more freedom in pursuing knowledge sharing initiatives and a reduction in conflict with other HQ organizations such as SC. The evolution of the AFMC KM program, however, has not gone accordingly. Since the leadership change in AFMC/DR, the vision for KM in AFMC is very unclear. To make matters worse, the KM issues and concerns are not even being surfaced to the AFMC Commander level. The lack of coordination between the AFMC KM team, the AFMC/DR leadership, and the AFMC command-level leadership has made progress difficult. Regardless of the setbacks, Adkins and TASC continue to

promote the concept of KM and the CLO, but no firm decisions about the future of

AFMC KM are yet evident.

AF KM evolution. While the AFMC KM program, including the KM systems,

continue to evolve so does the AF-level KM concept. Although still in its infancy, the

AF KM program is gaining attention. According to Adkins and his team, the philosophy

of an AFMC CLO fits well into what might eventually evolve for knowledge

management at the AF level. Although there was yet to be an official AF-level office or

strategy for knowledge management, such issues were already being worked in the Air

Force Communications and Information, Chief Information Officer/Business,

Information Management, Policy, and Planning Directorate. Whatever the result, with a

KM function and/or a CLO already in-place, AFMC would be in a good position to

implement AF-level policies and directives regarding KM. Even more so, with AFMC's

past experience, they would be in a good position to give guidance as to what KM in the

Air Force should look like. This coordination between the AF KM program office and

the AFMC KM Team, however, is simply non-existent. According to the AF KM office,

all efforts to establish KM for the AF are currently focused on the technical aspects of

developing the AF portal. Even so, AFMC and Randy Adkins still have much to offer.

Having had lots of experience in KM and a good background in AFMC, Mike Lipka had

this to say, "I think if the Air Force wanted to succeed, they would pull Randy Adkins

into [the] portal effort, give him a plum position and let his…years [of]

experience…drive part of that vision." Regardless, coordination is not happening and, as

a result, both organizations are again facing significant barriers to making their own and/or a consolidated KM effort happen.

Conflict with AFMC's IT Organization

Another coordination issue exists between AFMC KM Team and another directorate within the AFMC headquarters. Specifically, the existence of a Chief Information Officer (CIO) function within HQ AFMC/SC, the Directorate of Communications and Information, presents a major problem. The nature of the problem is that the SC CIO function sees many conflicts between its responsibilities and the actions being pursued by the AFMC KM Team. SC sees its role as providing technology solutions; AFMC KM is also providing technology solutions. Although the conflict has not escalated to an intolerable level, Adkins noted that his AFMC KM Team and the SC folks "just didn't talk anymore."

AFMC/SC has primary responsibility for command, control, communications, computer, and information (C4I) issues and execution. Although equivalent to AFMC/DR in AFMC's organizational hierarchy, SC possesses sole authority for policy, procedures, and standards with respect to C4I systems. In the past, as the AFMC KM team expanded its KM systems, a conflict had arisen with AFMC/SC regarding collaboration software tools. SC had mandated and implemented LiveLink software (from Open Source) as the only authorized collaboration tool. This action not only conflicted with the AFMC KM team's work on community of practice (CoP) virtual workspaces, but appeared to be, in the team's estimation, a much more sophisticated collaboration tool than was needed by the average customer. Based on the AFMC KM

team's in-depth experience, Adkins had tried to convince SC that a command-wide

LiveLink implementation would be excessively expensive for what it offered to

customers. Although Adkins had hoped to work with SC on KM issues, this

disagreement had driven them farther apart. He stated,

> "…we've had numerous discussions, but we have never been able to
>
> partner. So they're off getting everybody to do Livelink, trying to force
>
> everybody to do LiveLink. I'm off trying just to get people stuff to help
>
> them do their jobs better."

Knowledge of the conflict hasn't been limited to the HQs, either. When asked by Adkins

about his experience with LiveLink, one of his CoP customers had remarked, " I will tell

you…you are on the radar warning receiver. They know you're out there and you are a

huge threat to them."

Although Adkins has been able to continue his AFMC KM efforts, he knows that the

conflict with SC, regarding LiveLink or otherwise, is not going away. Because both

organizations claim a role in providing and establishing knowledge management systems,

conflicts will be ongoing. While Adkins and his team have a wealth of KM knowledge

and system development expertise, AFMC/SC is still the delegated policy maker. As SC

conflicts continue, AFMC KM risks being changed, dismantled, or simply taken over.

Control Factors

According to Holsapple and Joshi, "control is concerned with ensuring that

needed knowledge resources and processors are available in sufficient, quality and

quantity, subject to required security" (2000, p. 240). In examining control issues,

technical (e.g., security safeguards), social (e.g., practices that promote hiring people with similar cultural values), and legal (e.g., copyrights, classified vs. non-classified and FOUO information, patents) aspects must taken into consideration. A variety of control issues were identified in association with the AFMC KM program.

Lack of control of contractors. As was previously stated, both in-house and outside contractors make up the AFMC KM staff. Both relationships have been long-term, but they encountered some difficulty along the way. At the time of the case study, deliverables from the outside contractor were behind schedule, and those that had been presented were particularly useful. The KM staff implied that although they really could not make use of the models and strategic plan presented by the contractor, that maybe it was because they simply did not understand enough about KM to know what they were doing. Regardless, Adkins indicated that there would have to be some re-direction of contractor activities due to time and cost overruns.

Restrictive impact of external control policies. One of the major technical control issues associated with the AFKM system involved a new AF-level requirement that all AF websites would go to 128-bit encryption for increased security. This issue impacted the AFMC KM system components in that the search engine used in all the AFKM components now had to have the ability to search secure websites. Specifically, the search engine software had to be able to search government websites that used a secure socket layer protocol with 128-bit encryption. Without the ability to search the full-range of AF websites, the utility of the AFKM components, especially the Help Center, would be greatly reduced. This seemingly insignificant element of control required AFMC to

purchase an entirely new search engine (Verity) at a price of $120,000. Not only was the

expenditure unexpected, but also the manhours it took to convert all the software was

diverted from other necessary tasks.

Software procurement/use controls. Laws and regulations that govern software

licensing procurement and use also constrained AFMC KM efforts. As discussed

previously, the site licensing of LiveLink by AFMC/SC provided a significant barrier to

the AFMC KM team's efforts. Not only did they not have the authority to purchase or

recommend to their customers different collaborative software platforms, but the

purchase of off-the-shelf software was in direct conflict with the AFMC KM team's

approach to building a unified KM system. The legal and policy ramifications of KM

software control, purchasing, use, etc., significantly impacted AFMC KM's ability to

pursue a coherent KM approach throughout the command.

Realignment of technical focus. Another issue involving technical control arose

out of the changing nature of the AFMC KM team's tasks. In the beginning, the team's

tasks had been very technically focused—building the software to make the AFKM

components operational. Lately, however, their work had been more and more focused

on building community of practice workspaces for customers. In contrast to the early

need of keeping tight control of the AFKM software and processes, the team had begun

to build "CoPs in a box," hand them over to the customers, and let the customers

maintain the software from that point on. It was total change in philosophy and

approach. As such, the AFMC KM team realized that instead of being the sole purveyor

of KM systems in the command that they were now becoming facilitators for organizations who wanted to attempt KM on their own.

Social Control

Shaping the AFMC KM program team. Some elements of social control were also evident within the AFMC KM program. The most obvious manifestation was the attempt to shape and re-shape the AFMC KM team using outsourced personnel/contractors. In the early days of AFKM, the focus of outsourcing personnel was bringing in the necessary technical expertise to build the AFKM components. As the AFMC KM program and AFKM system evolved, however, the need to bring in personnel with a broader understanding of KM became a necessity. This was main driver in the program manager's decision to restructure the AFMC KM by bringing in TASC as the lead contractor. TASC had a good reputation in the DoD and had helped many other organizations put together robust KM programs by addressing a broad range of non-technical issues such as needs assessment, planning, and strategy development. By changing the nature and focus of personnel brought into the AFMC KM program, the program and the philosophical principals on which it was based were further reinforced and "controlled."

Cultivating partnerships. Another less evident, yet no less effective, method of social control came via the development of CoPs and the resulting partnerships with the user organizations. By helping these organizations build KM applications, in some cases for free, the AFMC KM team built powerful bonds and trusted allies with individuals as well as entire organizations. Again, this not only enforced the "KM is good" message that the

AFMC KM team was trying to spread, but it also built inertia and support for the

continued growth and expansion of AFMC KM efforts.

Legal controls—limiting information access. Given that AFMC is a military

organization, the legal control issues were a bit different than have been encountered in

private sector organizations. As for controls on the quality of information, not many

existed outside the concern for classified and for official use only (FOUO) information.

The need to keep classified information secure was addressed by simply not making

classified/FOUO systems accessible via any of the AFKM system components. The

inability to search classified systems for knowledge had a limited impact, however,

because most information/knowledge desired by AFMC customers is not of a classified

nature.

Information/knowledge quality. As for information or knowledge quality control

actions, none were uncovered. Given that the AFMC KM program is still immature, the

current emphasis is on establishing connectivity to potential information/knowledge

sources and developing tools to better access that information/knowledge. The focus has

not yet shifted to ensuring the quality or validity of the information/knowledge contained

in its websites.

Measurement Factors

Measurements needed to gain/keep leadership support. Despite rave reviews

from customers, the AFMC KM Team has been disturbed by the low AFKM system use

rates. Simple metrics show that the average number of hits for the AFKM website (any

component), has risen from an average of 150 hits per week in March 2001 to almost 600

hits per week in September 2001. Although use continues to rise, it is only a small portion of what the AFMC KM Team desires. As a result, Adkins and his Team have attempted to improve awareness with a series of road shows. They have traveled to many AFMC bases to market AFKM's products and capabilities. While this effort has increased usage, overall AFKM usage is still low. From a macro view, it is understood that knowledge management and the AFMC KM tools are still in their infancy. However, the low usage statistics do not help the AFMC KM team justify their budget. Adkins admitted he was glad that his superiors had so far supported the teams' efforts on intuition and an implicit understanding of their inherent value. However, he also stated that he could be asked at any time to measure the true impact and return on investment as a result of the AFMC KM efforts. Remarking about the necessity of good metrics, Adkins said, "…we had a budget drill not too long ago where I lost a little bit of money and some people…that reinforced the fact that I needed better metrics."

Lack of appropriate measures. In addition to the simple metrics being collected by the AFMC KM team, there were very few additional "measurement" or "valuing" activities being conducted in order to assess performance or value of the KM program and/or systems. Some of the CoP users were collecting metrics, but those metrics were also in the form website hit counts. Anecdotal evidence about the value of the various KM systems, especially the CoPs, abounded, but no other formal valuing activities were identified. For example, the champions of the Cost CoP raved about how the CoP had helped them and their customers. When asked about proof, they stated they had some simple metrics but it was basically a "no-brainer."

The existence of measuring or valuing activities and their associated importance appeared to be very closely connected to perceived rather actual management requirements.   In no instance was it found that measurement or valuing was an initial barrier to the establishment or continuation of any KM program/system. The understandable, inherent value of the systems appeared to give them legitimacy, at least at the onset. The case of the AFMC KM team losing funding because of a lack of robust metrics, seemed to indicate that as the programs grow bigger in scope and begin to compete with other programs for resources, that measurement, especially if it does not capture the true value of a program, can become a barrier to future KM efforts.

Summary of Managerial Influence Factors

The AFMC KM case study indicates there are a variety of managerial influence factors that act as barriers to organizational KM. Table 7 summarizes these influences.

Table 7. Summary of Managerial Influence Factor Findings for AFMC

Influence Factor	Finding
Leadership	• Lack of leadership commitment at critical levels • Lack of reinforcing behaviors
Coordination	• AFKM name conflict • Uncoordinated evolution of AFMC and AF KM programs • Conflict with IT organization
Control	• Lack of control of contractors • Restrictive impact of external control policies • Re-aligning technical focus • Shaping the AFMC program team • Cultivating partnerships • Limiting information access • Restrictive software procurement/use policy • Absence of information/knowledge quality controls
Measurement	• Measurements needed to gain/keep leadership support • Lack of appropriate measures

Resource Influence Factors

The purpose of the second research question was to identify resource influence factors that act as barriers to organization knowledge management. In investigating the question, financial, human, material, and knowledge resources were addressed. The responses will be discussed in the general order the questions were posed.

Financial resources

Lack of adequate funding. An unexpected excess in funds started KM in AFMC in the late 1990s, but holding onto that money has been a challenge ever since. Under Mulcahy's leadership, funding was not a serious issue, but such has not been the case under the new leadership. Recently a $600,000 budget cut for FY 2002 forced the program manager, Randy Adkins, to make hard tradeoffs that will affect AFMC KM's future. As such, he had to dismiss six contractor personnel and subsequently reassess, re-

prioritize, and reorganize the current workload distribution. The reduction in budget

means AFMC KM programs and systems will have to be scaled back at a time when, in

the AFMC KM's team's opinion, they are needed the most.

The lack of financial resources does not only have a direct effect on the AFMC KM team

and efforts, but also an indirect effect AFMC KM customers. From its inception, the

AFMC KM program had attempted to serve a wide range of customers. Whether it was

supporting DoD-wide efforts such as Deskbook, AFMC internal efforts such as the Help

Center, or outside command efforts such as the Engineering and Technical Services CoP

for Air Combat Command, the AFMC KM project team had eagerly built new

applications. While some of the projects had been fully funded by the requesting

customer, many had been accomplished on an as-can-pay basis or without funding

support at all. Adkins admitted that that without AFMC KM team's help and funding

support, some of their customers would never be able to get their KM efforts off the

ground. With the budget cuts now a reality, customer support and proposals for new

projects have to be re-evaluated. Support levels will definitely have to reduced in one

way or another further thwarting KM progress.

Restrictive budgeting environment. The cyclical, inflexible, and long-lead-time

nature of the military budgeting process also impacted AFMC KM efforts. The AFMC

KM team found itself trying to respond quickly to new requirements and changes under

the constraints of a budget that was planned almost two years previously. In most cases

new requirements, such as the Verity search engine, could not have been contemplated

during the budget submission process. An AFMC emergency fund had been established

for unexpected requirements that could not be covered under the existing budget process,

but competition for the funds was very stiff. TASC had also identified in the AFMC

Cultural Needs Assessment that disconnects existed between requirements and funding of

acquisition and sustainment programs and that spending was very stovepiped by

functional areas. This funding environment not only made it hard for the AFMC KM

program team to maintain adequate funding for its own projects, but also made it difficult

to pursue enterprise-level KM initiatives.

Human Resources

Lack of manpower availability. Closely related to the financial resource issues,

are the manpower availability issues that evolve out of the need to tighten and reduce

labor costs. In the case of AFMC KM, the reduction in budget required a scaling back of

contract scope and an accompanying reduction of contract personnel. Again, this

provided a barrier to KM in that it caused a loss of skilled and knowledgeable personnel

and also reduced the level of help that could be provided to existing or potential

customers. With the success of the AFMC KM programs, new customers had begun

asking for help in developing new KM applications. This generated increasing workload

demands that could not, as a result, be addressed. While customers were looking for

smarter ways of capturing knowledge and sharing it, the project team's human resources

were cut.

Lack of KM expertise, knowledge and skill. The AFMC KM program manager

stated that he constantly encountered a "lack of knowledge about knowledge

management." Few individuals, at any level across AFMC, had much idea of what

knowledge management, knowledge sharing or knowledge manipulation was about.

Adding to the confusion was the fact that there was no accepted standard definition for

knowledge management. While people could understand the importance and utility of

individual KM applications, such as lessons learned databases, document repositories,

and electronic yellow pages for experts, they still found it difficult to relate to a larger,

organizational knowledge management concept. This situation made it hard to get people

interested in what AFMC KM was doing. Adkins realized that learning about KM took

time, but he also knew ignorance could threaten the AFMC KM program's survival

before it really had a chance to prove itself on a large scale.

"Outsourced" personnel commitment. For AFMC, outsourcing for human

resources and accompanying KM expertise and skill was a necessity. In the military,

outsourcing for KM assistance is driven by two main factors 1) the lack of in-house KM

expertise and 2) the limits on creating new military or civil service positions to handle

KM functions/programs. As a result, contractors played a significant role in the AFMC

KM effort from the start. Although the ability to outsource for KM expertise and

assistance is considered positively, the barriers that arise from the fact that some of the

contractor personnel feel they are outside of the tight-knit military organization or they

simply do not have the same allegiance or dedication to the KM effort because they are

only contractors.

Material Resources

  Lack of KM software and systems. The technical infrastructure (i.e.,

communications and computers) available throughout AFMC and the rest of the AF was

a positive issue in the AFMC KM effort. Although constantly evolving, the technical

infrastructure provided a solid and sufficient platform for the AFKM system for both

AFMC and users. Without the robust technical infrastructure, use of the Internet and

associated technologies as integral components of the AFKM system and processes

would not have been possible. One technical barrier that was evident, however, was a

lack of standard collaborative and KM-supporting software applications. The lack of an

AF-standard for collaborative software caused customers to purchase a wide variety of

ultimately incompatible software to serve KM purposes.   Also, because the development

of KM systems was relatively new, many different organizations, including AFMC, were

developing their own applications in-house.   The lack of a common technical direction

with respect to KM software and systems has and continues to impact the very purpose of

KM which is knowledge capture, transfer, and re-use across organization boundaries.

  Challenges of technology evolution. Although blessed with a robust technical

infrastructure, the AFMC KM team still had to face challenges associated with ever-

evolving technology. As such, the technical members of the team were very skilled in

responding to the fast-paced changes in technology. In the past, they had Web-enabled

all their products, making extensive use of technologies such as HTML, java script,

active server pages, etc. After the Deskbook, Lessons Learned*,* and Help Center software

products achieved stability, they pushed further and had found a niche in developing CoP

virtual workspaces for customers. They became so proficient that eventually they could

hand over a "CoP in a box" with a few minor customer-specific tweaks in only a few

days time. Instead of providing content, as done with Deskbook and Lessons Learned,

the team simply provided the framework and made the customer responsible for filling in

the information/knowledge.

Challenges of technology policy/strategy evolution. Besides the challenges

associated with new technology itself, the team had to deal with changes in policy and

strategy as result of that new technology. Such was the case with the development of the

AF Portal.   The new AF Portal, was to be, by AF decree, the de-facto single access point

for all AF information and knowledge. This new policy immediately raised the question

of how to design future AFMC KM applications. The program manager, Adkins,

acknowledged that his team was still heavily involved in the technology piece of building

virtual communities of practice, but saw that the capabilities of the AF portal would

eventually change that. Because the AF portal offered some community features, he saw

the technical nature of their work on CoPs possibly changing. As such, he had to

consider many new issues: How should AFMC KM products tie into the AF portal?

How could AFKM take advantage of AF portal capabilities? Would AFMC KM lose its

identity and mission with the establishment of the AF portal? Would the AF Portal

provide new collaboration tools that would conflict or supersede those developed by

AFMC KM? Although this new technological evolution and the associated policy

changes provided immediate barriers to AFMC KM programs and software development,

the portal concept at the same time provided promise of more standardized KM

applications in the future.

KnowledgeResources

    Human knowledge resources. Human knowledge resources are the "raw

materials" (Holsapple and Joshi, 2000, p. 241) for knowledge activities. The existence of

human knowledge resources throughout AFMC was extensive. Mulcahy had recognized

this early on and had tried to use KM to stem the brain drain. The recognition of the

critical importance of these human knowledge stores, however, was not universal. None

of the AFMC KM systems specifically addressed tacit knowledge capture.

    Lack of "knowledge about knowledge management." Another human knowledge

resource issue was the "lack of knowledge about knowledge management" that partially

drove the outsourcing of many KM functions. The AFMC KM team's lack of knowledge

about various aspects of KM lead to the hiring of TASC. This initial lack of knowledge

led to the development of inadequate requirements document for TASC. TASC

attempted to act on the requirements document by completing tasks and projects that did

not turn out to be what the AFMC KM team really wanted or needed. A specific example

involved the development, by TASC, of an IDEF (integrated definition) model. This

IDEF model was presented as the fulfillment of a requirement to build a strategic vision

and plan. Once Randy Adkins and his team saw the product, they were confused.   Not

only did they wonder how this could be the strategic vision and plan, but they could not

even understand the IDEF model. The vicious circle that developed as a result of the lack

of human knowledge about KM provided a significant barrier to successfully
implementing KM in AFMC.

Lack of knowledge of organization KM strategy. Human knowledge of
organization strategy is a knowledge resource that does impact organization knowledge
management. As alluded to earlier, the AFMC KM team's knowledge about existing (or
non-existent) strategy (KM or otherwise) significantly impacted their approach to
procuring funding, developing systems, and creating new strategy. Even TASC, in
conducting an AFMC cultural needs assessment, identified the importance of strategy
integration. In its final recommendations, TASC stated that AFMC should "launch a
reshaping mission by the AFMC Commander that links the KM strategy to the AFMC
Acquisition and Sustainment Strategic Vision and Plan" (AFMC Cultural Needs
Assessment, p. 16). Overall, the lack of a coherent AFMC and non-existent AF-level
KM strategy provided a significant barrier in that many of the personnel involved simply
did not know what to do or what action to take next.

Lack of knowledge of KM-supportive organization culture. Knowledge of
organization culture is also a human knowledge resource that significantly impacts the
implementation of KM. Many KM experts have identified culture as being the most
important, yet most difficult, part of any KM effort to address. Culture has been defined
as a pattern of accepted habits, values, and rules, most of which are so deeply internalized
that they are unconscious or semiconscious at best (Schein, 1985). "Organizational
processes, standards, and policies are instruments that organizations use to maintain their
culture intentionally or unintentionally" (AFMC Cultural Assessment, 2001, p. iii). The

AFMC KM program manager and AFMC/DR leadership had recognized the importance of addressing culture issues as a major part of their KM effort. The fact that AFMC is a military organization with a very distinct and strong culture made the issue primary. As a result, the first major deliverable required of TASC was to conduct a cultural and technical needs assessment of AFMC. The cultural needs assessment was used as a tool to baseline the current AFMC culture. This tool revealed information necessary for making recommendations regarding how the current culture needed to be changed in order for it to transform into a knowledge-centric workforce. The major cultural barriers identified by TASC in he AFMC Cultural Needs Assessment (2001) included:

- Lack of existing change management plan for transitioning to KM

- Lack of formal communications plan to articulate vision to all groups

- Lack of formal reward system for rewarding knowledge sharing or collaborative behavior

- Lack of personnel practices the allow capture of tacit knowledge and creation of new knowledge

- Stovepiped thinking about programs, policies, and resources

- Lack of continuity due to continuous leadership and personnel turnover

- Lack of appropriate measures or values that address knowledge

- Lack of a supportive funding process tied directly to organization needs

- Lack of knowledge about the value of KM; confusion about KM projects versus IT projects

Although TASC did recognize "positive attitude" as a strength of the military/AFMC culture, it was simply not enough to overcome the other major cultural barriers. Significant work remains to be done in transforming AFMC to a knowledge-centric culture.

Summary of Resource Influence Factors

The AFMC KM case study indicates there are a variety of resource influence factors that act as barriers to organizational KM. Table 8 below summarizes these influences.

Table 8. Summary of Resource Influence Factor Findings for AFMC

Influence Factor	Finding
Financial	• Lack of adequate funding • Restrictive budgeting environment
Human	• Lack of manpower availability • Lack of KM knowledge, expertise, and skill • "Outsourced" personnel commitment
Material	• Lack of standard KM software/systems • Challenges of technology evolution • Challenges of technology policy/strategy evolution
Knowledge	• Lack of tacit knowledge capture • Lack of "knowledge about knowledge management" • Lack of knowledge about organization/enterprise KM strategy • Lack of knowledge about KM-supportive organizational culture

Environmental Influence Factors

The purpose of the third research question was to identify (external) environmental influences that act as barriers to organization knowledge management. Some of the major environmental influences previously identified in the literature include: GEPSE (government, economic, political, social, and education) climate,

technology, competitors, fashion, and time (Holsapple and Joshi, 2000). Although some of these influences appear inappropriate for military organizations, they can have meaning when examined from a military context. The responses will be discussed in the general order the questions were posed.

GEPSE Climate

Undoubtedly, the GEPSE climate has an impact on all facets of the military at large. However, at the AFMC/DRA level the direct effects were barely recognizable. The most apparent manifestation of these external factors stemmed from the economic climate. A further tightening and reallocation of the defense budget had ultimately caused budget reductions at the AFMC/DR level. This resulted in a budget cut to the AFMC KM program and also created fears about continued funding levels.

Proliferation of KM Vendors and Products

Technology advances external to AFMC have for the most part been beneficial for the KM effort. Software tools and technical infrastructure products have helped to make the AFMC KM system as robust as it is. The only barrier identified as a result of external technology influences was the incompatibility and inconsistency problems encountered as different types of KM software have proliferated. Vendors are developing numerous KM products. Some of the products truly focus on facilitating knowledge transfer, while others are standard databases, document management, and search engine products disguised as KM products. Variety is good for the marketplace, as organizations have a wide range of KM needs, but the downside is the proliferation of incompatible products in the hands of uninformed users without a unified vision for KM.

KM Fashion/Competition

Although the concept of fashion in the military differs from that in the private

sector, AFMC KM has definitely benefited from KM being a fashionable, or trendy,

business concept. The original AFMC KM team members quickly realized the value of

fashion when they adopted the term knowledge management to describe what they were

doing. Because KM was a hot topic in industry and relatively new to the military, the use

of the term got them added attention and subsequent funding. Fashion in this case was

not found to be a barrier to AFMC KM efforts.

The concept of competition is also different when applied to a military versus a

private sector organization. The separate military services definitely compete with each

other for limited resources, but the nature of competition is in many ways different than

in the private sector or industry. The fight for limited resources in many ways drives the

services to try to keep up with each other. No service can afford to be perceived behind

in any area for the fear that another service will pick up more missions, funding, etc.

Given that this is most always the case, it is curious that the AF and AFMC are not

concerned about inter-service competition with respect to KM. It is well known that the

Department of the Navy has one of the best KM programs in the country and possibly the

world. The U.S. Army also has a burgeoning KM program that promises to be robust as

well. Despite the progress and reputation of these sister services for KM, the AF (at all

levels including AFMC) seems to be unconcerned that its KM efforts are practically non-

existent. Overall, competition, with respect to KM, was not found to be a barrier to

AFMC KM efforts.

Time

The need to make better and faster decisions and the need to complete tasks in a more timely and efficient manner have been the "time" elements that have primarily driven AFMC KM efforts. The lack of time has acted as a barrier to KM in that in today's fast-paced environment there seems to be less and less time to institute new KM programs or procedures, to develop KM systems, and to capture individuals' attention about new concepts and new ways of doing business. Adkins and his team ran into this problem when doing the advertising road shows. What they found was that many more customers could benefit from AFMC KM systems than were using them. These customers had not been using the systems because they were either unaware or simply did not have the time to try anything new or different for fear of falling behind in their everyday routine.

Summary of Environmental Influence Factors

The AFMC KM case study indicates there are a variety of environmental influence factors that act as barriers to organizational KM. Table 9 summarizes these influences.

Table 9. Summary of Environmental Influence Factor Findings for AFMC

Influence Factor	Finding
GEPSE Climate	• Impact of indirect economic pressures
Technology	• Adverse impact due to proliferation of external KM vendors/products
Competition/Fashion	• N/A
Time	• Lack of time to try KM

Summary of Influence Factors for AFMC KM

In summary, this chapter has presented the findings from the AFMC case study.

Using Holsapple and Joshi's influences framework (2000) as a guide, the three classes of

influence factors—managerial, resource, and environmental—have been examined. The

findings suggest that a variety of influence factors act as barriers to implementing

organization knowledge management. These findings are compared to additional case

studies and presented in the following chapters.

CHAPTER FIVE--U.S. ARMY MEDICAL DEPARTMENT[5]

Organization and KM Program Profile

Organization Structure and Mission

The U.S. Army Medical Department (AMEDD) includes all the organizations, both administrative and operational, that come together to perform the Army healthcare mission. The AMEDD currently includes the Army's fixed hospitals and dental facilities; preventive health, medical research, development and training institutions, and a veterinary command that provides food inspection and animal care services for the entire Department of Defense. In addition to maintaining day-to-day healthcare for soldiers, retired soldiers and the families of both, the AMEDD deploys units in support of
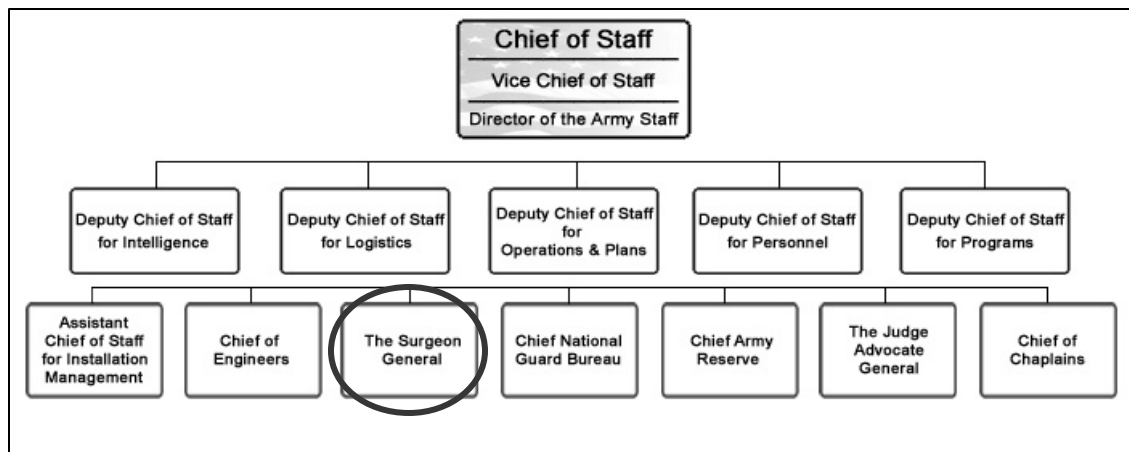
Figure 16. Department of the Army Organization Structure

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[5] Information for this case, except where stated otherwise, is based on inteviews conducted February 25-27, 2002, at the AMEDD Center and School.

 combat scenarios, humanitarian assistance, peacekeeping, and other stability and support

operations. The AMEDD comes under the direction of the U.S. Army Surgeon General

who reports directly to the Chief of Staff of the Army (see Figure 16).

The U.S. Army Medical Command (MEDCOM) is one of the Army's fifteen

major commands (Figure 17). The Surgeon General also doubles as the MEDCOM

commander. The resulting Army Medical Department organization structure is depicted

in Figure 18.

HQ US Army		
US Army Europe	US Army Forces Command	US Army Material Command
US Army Training and Doctrine Command	US Army Corps of Engineers	Eighth US Army Korea
US Army Medical Command	US Army Pacific Command	US Army Space and Missle Defense Command
US Army Special Operations Command	Military Traffic Management Command	US Army Military District of Washington
US Army South	US Army Intelligence and Security Command	US Army Criminal Investigation Division

Figure 17. U.S. Army Major Commands

Commanding General MEDCOM/ Surgeon General Chief of Staff/Deputy Surgeon General	
Executive Agencies	Commanding General, MEDCOM/ Surgeon General Staff
Headquarters Directorates	Major Subordinate Commands
	Army Medical Department Center and School
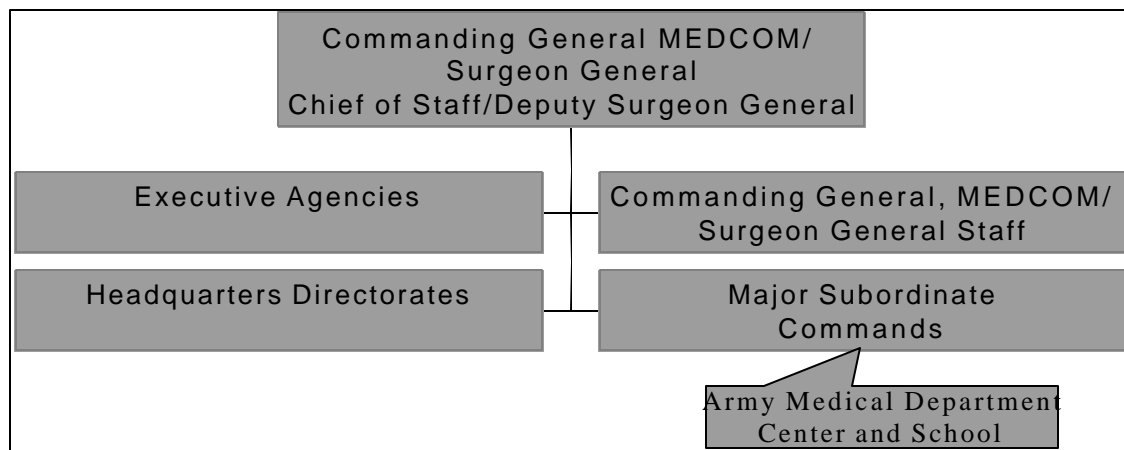
Figure 18. Army Medical Department (AMEDD) Organization Structure

AMEDD KM Program "Home"

The Army Medical Department Center and School (AMEDDCS) is one of the major subordinate commands of the Army Medical Department as seen in Figure 18. Within the AMEDDCS exists the Center for Healthcare and Education Studies. Within the Center for Healthcare and Education Studies is the Leadership and Instructional Innovations Branch (LIIB). This is the home of the AMEDD KM program. Figure 19 depicts the basic organization structure[6].
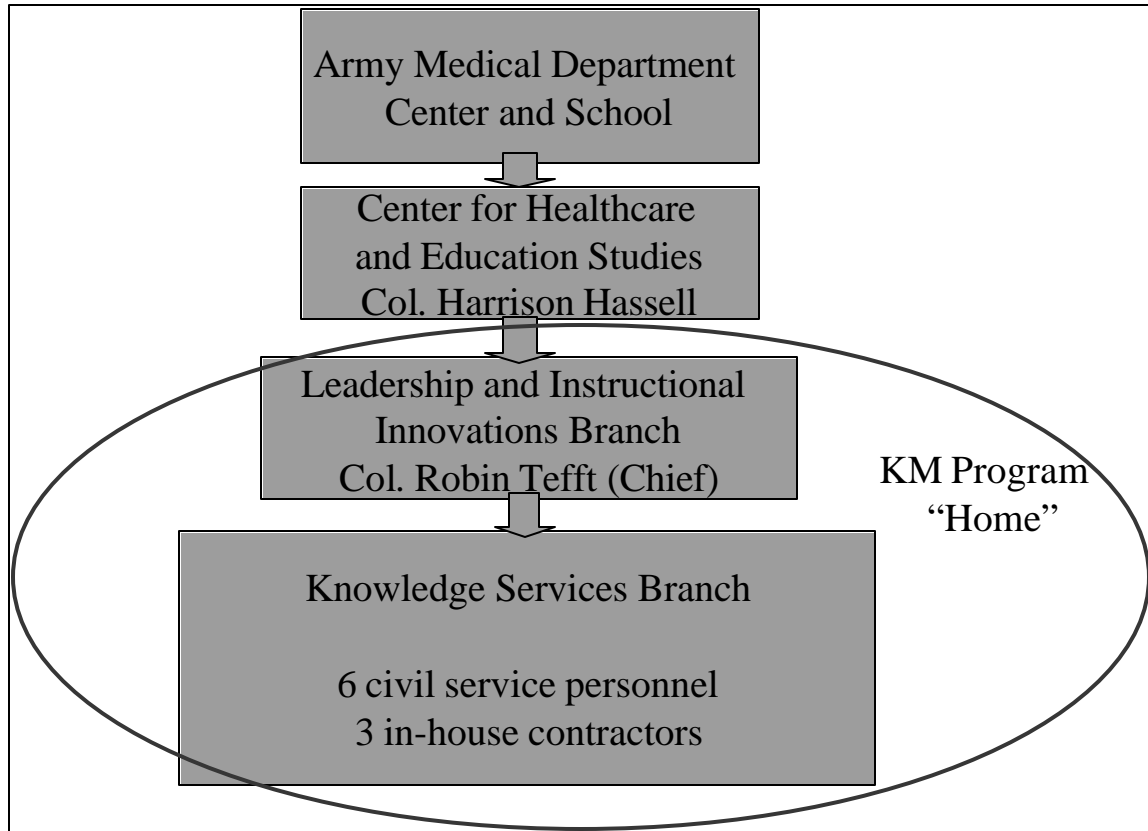
Figure 19. AMEDD KM Program "Home"

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[6] Figure 19 depicts the organization at the time of the case study, February 2002. This organization structure has since changed, but the AMEDD KM program staff remains together.

History

The AMEDD knowledge management effort began in 1997. At that time a

visionary leader within the Center for Healthcare and Education Studies (CHES) became

familiar with the concepts of knowledge management and became convinced that they

could be used to serve the AMEDD community. Having an in-depth IT background, this

visionary leader saw the use of software technology and existing networks as a way to

connect members of the AMEDD community and make common documents/information

easily available and accessible. Using available contractor manpower resources and

funding, a "first-generation, web-based KM initiative" (Tefft, 2002, p. 1) called the

Knowledge Management Network (KMN) was built and launched. In general, it

consisted of some basic commercial products integrated into a website. More

specifically, the KMN "incorporated the fundamental features of a KM (system): a

collaboration tool, a library, a process for certifying knowledge, and a database of subject

matter experts" (Tefft; 2002, p.1). Although rudimentary when compared to today's KM

system standards, it laid the necessary foundation for future KM efforts.

In early 2000, due to lackluster use of the existing KMN, a dwindling funding

stream, and dissatisfaction with the contractor-provided products and performance, the

then new CHES leadership, specifically Colonel Hassell and Colonel Tefft, decided to re-

shape and evolve their knowledge management efforts. At the same time, the CHES

recognized that KM system and infrastructure development should become a core

competency of the Knowledge Services staff. As a result, the outsourced contractor

support and development of the KMN was discontinued and brought in-house. Bringing

the KM system development in-house immediately translated into increased flexibility

and decreased turnaround time at a reduced cost. It also precipitated a change by making

the KM system staff and in-house contract employees "integral to developing, deploying,

and maintaining the website" (Tefft, 2002, p.1). These basic, yet significant changes

allowed the CHES to develop the next-generation KM initiative, called the AMEDD

Knowledge Exchange (KE). The new AMEDD KE incorporated the best of the old

KMN yet expanded its focus to more strategic initiatives. According to Colonel Robin

Tefft, Chief of the Leadership Instruction and Innovations Branch, "With this redesign

came the understanding that KM is not an information management or information

technology tool, but a strategic imperative in its own right" (Tefft, 2002, p.1).

AMEDD KM Vision

Members of the AMEDD KM program openly state that their initial efforts were

very technology-focused and technology-driven. Time and experience eventually proved

to them, however, that the soft issues such as people, processes, and organization culture

were paramount. As a result, the AMEDD KM effort is currently in transition. The new

vision for AMEDD knowledge management states:

> The AMEDD of the future leverages knowledge as a strategic resource
>
> through integrated knowledge management systems and a culture that
>
> embraces knowledge sharing.

According to Colonel Tefft, "This vision addresses the nexus of people, process, and

technology, the triad of enabling factors that drive an organization. Using KM to

integrate and improve health care delivery processes will yield greater efficiency and

quality, but only if the organization culture is ready to contribute collaboratively" (2002,

p.1). The specific goal of today's AMEDD KE is to provide an Internet-based platform

for an integrated approach to identifying, managing, and sharing AMEDD information

assets so information and knowledge flow to the right people at the right time.

Additionally, a further objective of the KE is to support strategic AMEDD business

processes using numerous strategies, tools, and commercial applications.

Given the new strategic focus, it is understood that the AMEDD KM effort must be

championed and supported by the highest levels of leadership and those throughout the

enterprise. To achieve this integrated and collective approach, the formation of an

AMEDD Knowledge Management Steering Committee has been proposed. The purpose

of this committee, to be composed of a cross-section of AMEDD personnel, would be to

determine the strategic priorities that can be enhanced by KM. The committee should

serve to develop policy, establish priorities for KM investment, monitor resources,

measure progress and serve as a liaison to other KM entities internal and external to

AMEDD (Tefft, 2002). Although the committee has not yet formed, the strategic

imperatives to be considered for the future, as articulated by Colonel Hassell, include:

- Transform AMEDD culture so that the identification, collection, and storage,

   dissemination, and use of knowledge is a strategic priority and a universally

   shared value.

- Create the AMEDD Virtual Library that includes the universe of AMEDD

   content.

- Create an AMEDD taxonomy and a search-and-retrieval capability for all knowledge.

- Develop policy for standard system architecture to support e-business.

- Provide the capability for communities to create and share knowledge.

- Integrate health care information systems.

- Develop a single-user interface for KM.

- Provide multiple venues for knowledge sharing, such as local area networks, wireless devices, intranet, and Internet.

- Capture and share individual tacit knowledge. (Tefft, 2002)

AMEDD KM System

The current and future evolutions of the AMEDD KM system are conceptualized and designed using a three-tiered approach developed by the American Productivity and Quality Center. This three-tiered approach includes:

- A fundamental tier that includes a self-service website for AMEDD content.

- A second tier that supports the development and support of communities of practice.

- A third and final tier that allows for customized web-based programming to support AMEDD strategic initiatives.

The technical infrastructure of the AMEDD KM system includes the use of redundant servers with worldwide connectivity provided via an Internet backbone. According to Colonel Tefft, the general design specifications of the system are as follows:

The backbone of the Knowledge Exchange is a database. All data are

stored as objects in a database, providing the capability to search and

retrieve all data on the site. The data are delivered to the Web using PHP

(hypertext pre-processor) programming. Collaboration tools are custom-

designed in hypertext markup language. The programming strategy is to

provide basic tools needed by the user in applications and languages that

are currently available in the AMEDD architecture. The programmers use

applications that are available to most AMEDD users and avoid requiring

users to download additional applications. (2002, p. 2)

Applying this very clear conceptual foundation and operational heuristics, the AMEDD

KM system (or KE) continues to evolve. As February 2002, the AMEDD KE website

home page (see Figure 20) stated:

The purpose of this Internet application is to provide a web-based

collaborative platform that is accessible to the entire Army Medical

Department and its partners….A primary goal of this effort is to extend

the benefits of knowledge management tools and capabilities to the

AMEDD knowledge worker. The intent…is to help individuals and their

associated business processes become more successful in the belief that

successful knowledge workers evolve an ever-improving and successful

AMEDD.
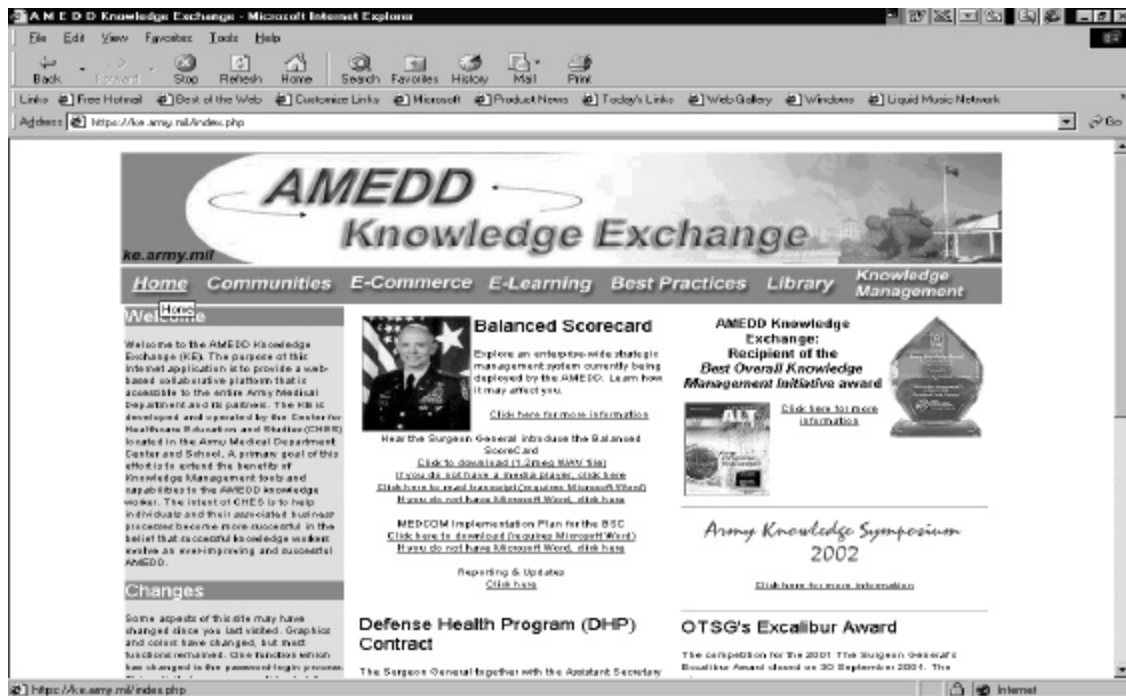
Figure 20. AMEDD Knowledge Exchange (KE) Home Page

AMEDD KM System Components

The AMEDD KE uses a central website (https://ke.army.mil) as its portal. This

central website acts as a hub for access to a variety of functions that include:

communities (communities of practice forums), E-commerce, E-learning, best practice,

library, and knowledge management workspaces (Figure 21).
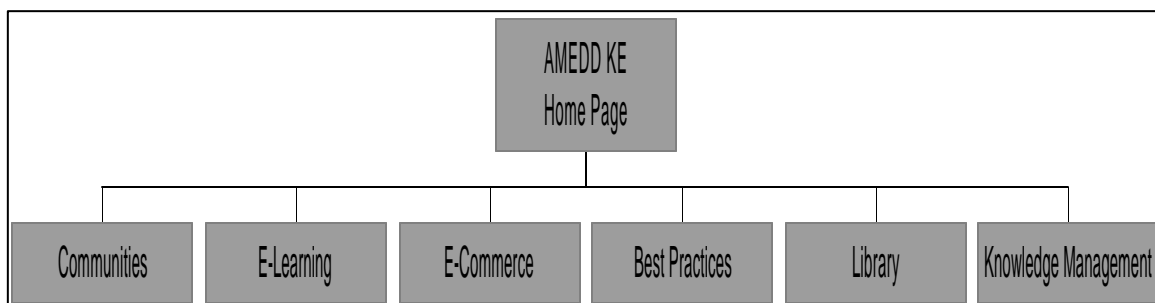
Figure 21. AMEDD KE Components

In general, the communities component supports a variety of communities of practice. These communities, composed of individuals such as information management officers, physician assistants, deputy commanders for administration, etc., allow knowledge sharing through collaboration. The E-commerce component is relatively new and provides a workspace for the Surgeon General's Balanced Scorecard strategic management program, a decision support center for data analysis, and a roster and information that identifies subject matter experts as identified by the Army Surgeon General. The E-learning component supports the training and education effort of the AMEDD. This component provides information and some discussion areas regarding training opportunities and resources, a closed discussion area for staff and faculty, and acts as the hub for the AMEDD Center and School distance learning program. The best practices component (or the AMEDD Best Practices Network as it is referred to) is, as stated on the website, "…the tool the senior AMEDD leaders have chosen to capture and share successful clinical and business practices.…[where] best practices are defined as superior methods or innovative practices that result in improved processes."

The Library component is still under construction; however, the vision is that it will be the central repository of knowledge products produced by the AMEDD, such as policies, briefings, information papers, guidelines, and any products that are of corporate interest. The knowledge management component is the newest addition to the AMEDD KE. Its purpose is to provide information about knowledge management and to provide success stories about how it is positively impacting AMEDD operations.   A screen capture of each of the AMEDD KE components is shown in Figures 22-27.
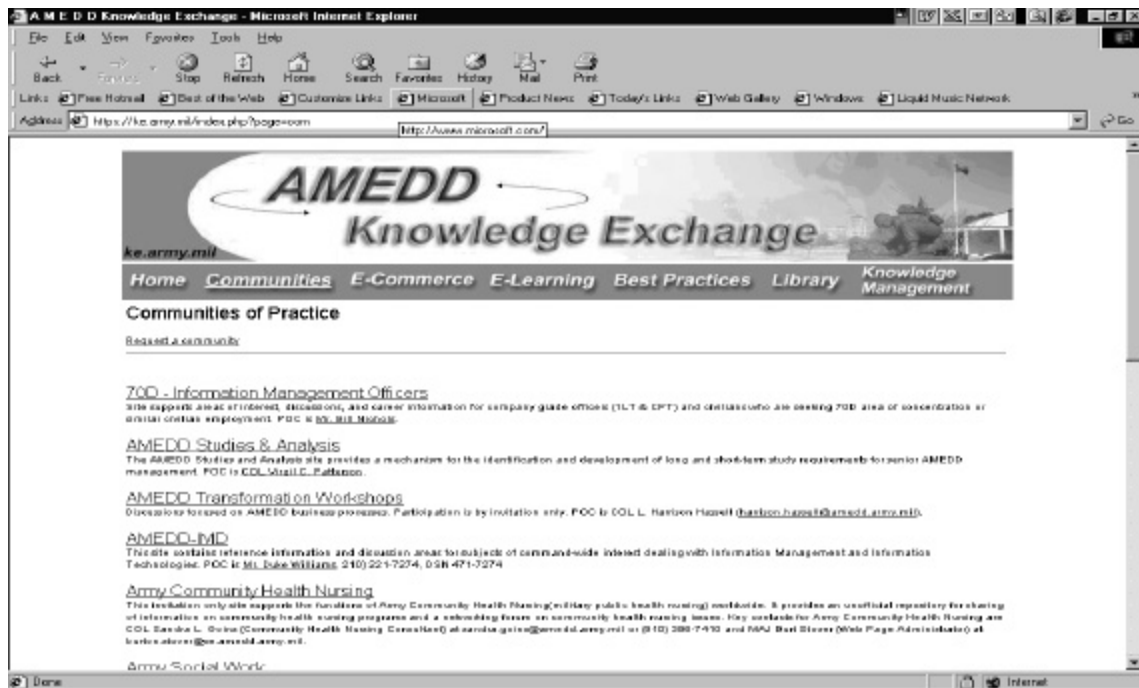
Figure 22. Communities of Practice Component
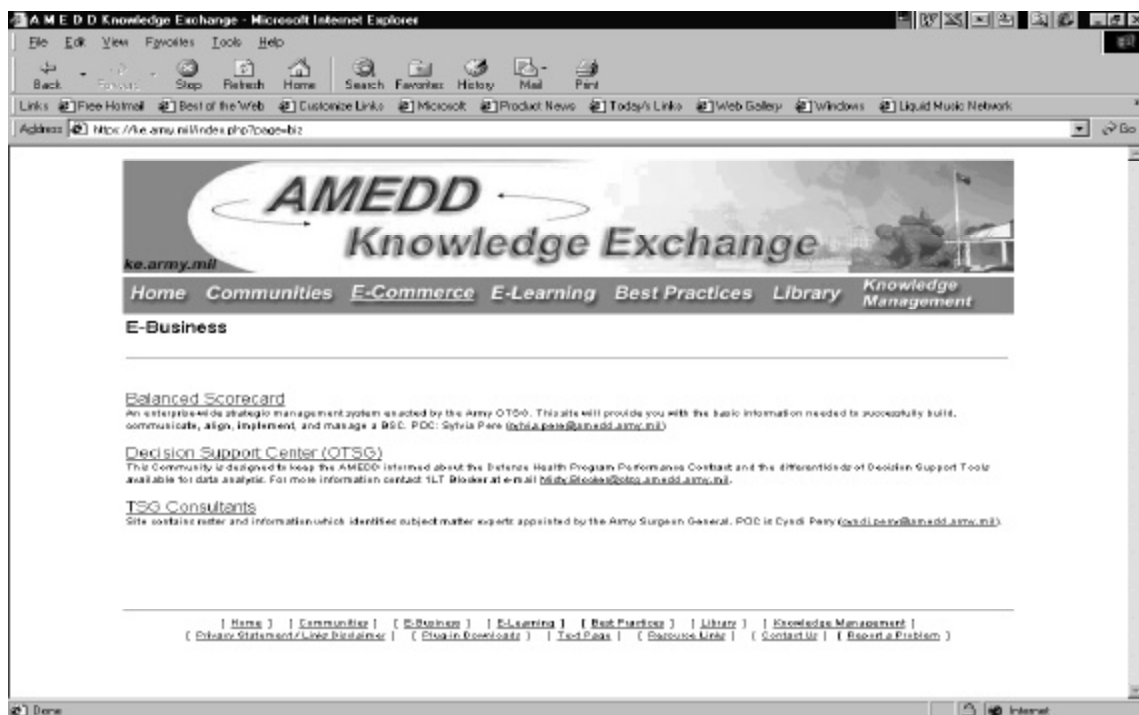
Figure 23. E-Commerce Component
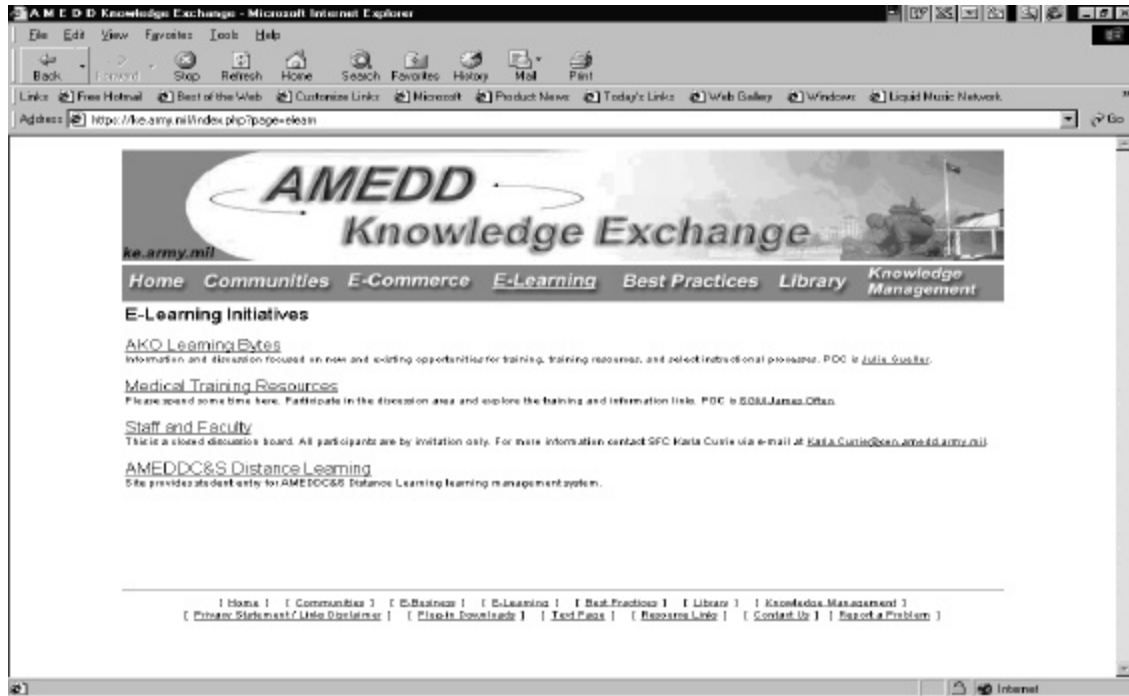
Figure 24. E-Learning Component

Figure 25. Best Practices Component

Figure 26. Library Component
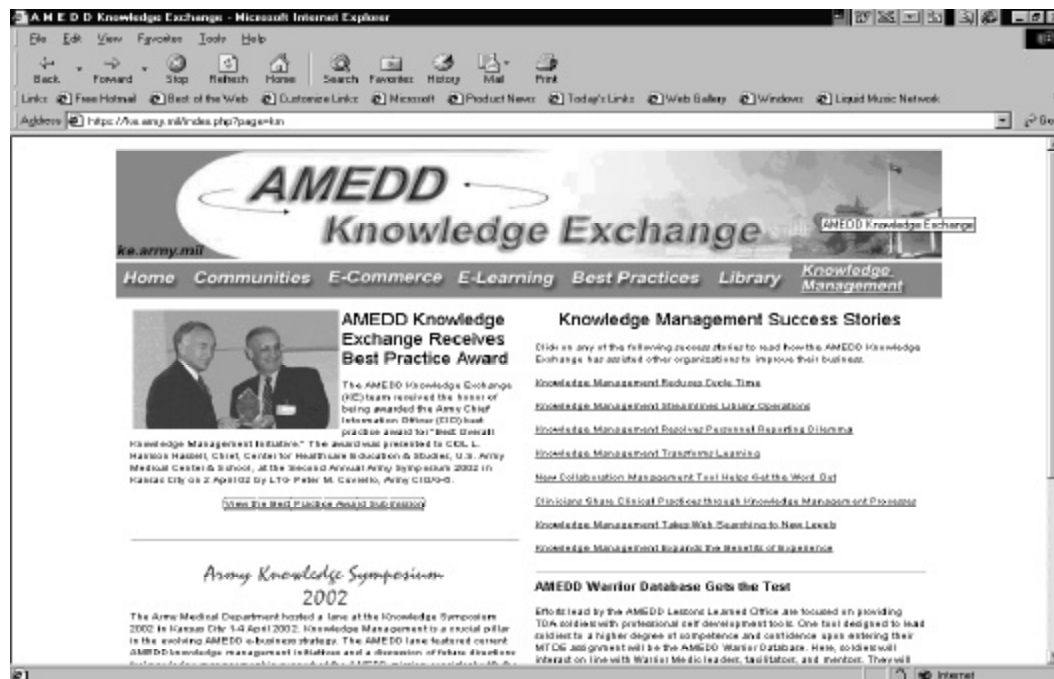
Figure 27. Knowledge Management Component

AMEDD KM Program Team

As was mentioned previously, the initial work on the Army Knowledge Network

was accomplished by outside contractors. These contractors had been working on

information systems for AMEDD for quite some time so it was a natural evolution for

CHES leadership to transition work on a knowledge management system to them. This

approach, however, allowed both the "developmental philosophy and technical

applications to be strongly influenced by contractor subject matter experts" (Best

Practices Award Submission, 2002). For this reason and others previously explained, the

new CHES leadership decided to take a different approach in 2000. The outside

contractors were dismissed and new contract employees were hired to work in-house with

the existing AMEDD KM staff. Other civil service staff members were also reorganized.

Ultimately a new "knowledge services" function was created. Although aligned

organizationally under the Leadership and Instructional Innovations Branch, the

Knowledge Services function would serve to support not only CHES, but also AMEDD

at large. Figure 19 shows the composition of the Knowledge Services staff function.

Besides reducing overall costs considerably, the new organization and approach

allowed for more flexibility in product development, provided for a more integrated,

team-oriented approach to AMEDD KM goals, and allowed the development of

necessary core KM competencies within the knowledge services staff. The AMEDD KE

staff adopted the following processes in order to better approach the development of a

user-focused AMEDD KM tool:

- Develop in-house consultation and development skills to minimize cost and cultivate internal expertise.

- Develop a KM website with a simple, flexible user interface that encourages the sharing of information.

- Build in the ability for non-technical customers to independently manage their own content.

- Use the KM website as a key asset for the development of an AMEDD culture. (Best Practices Award Submission, 2002)

Findings on Influence Factors that Act as Barriers to KM in AMEDD

Managerial Influence Factors

The purpose of the first research question was to identify managerial influence factors that act as barriers to organization knowledge management. Using Holsapple and Joshi's influences framework (2000) as a template for discussion, the following managerial influence factors are discussed: leadership, coordination, control, and measurement. The findings are discussed in the general order the questions were posed.

Leadership Factors

Lack of executive leadership commitment. Despite the staunch leadership support found within the AMEDD Center and School, Center for Healthcare and Education Studies (CHES) and its Leadership and Instructional Innovation Branch (LIIB), strong leadership commitment to the AMEDD KM effort at higher levels had not been evident. Colonel Harrison Hassell, Chief of the Center for Healthcare and Education Studies,

stated that the KM efforts lacked "an influential champion at the executive level." This idea was seconded by other interviewees including Colonel Robin Tefft, Chief of the Leadership and Instructional Innovation Branch, who stated when describing Colonel Hassell's efforts to sell the KM program, "…he's made every best effort to get the senior leaders to buy into it and for whatever reason it has not occurred." Many ideas were posited as the reasons for lack of leadership support, however, the most prominent included the "lack of knowledge and understanding about KM concepts and philosophies" and "the belief that KM is just another management fad." The lack of top leadership support had made many facets of managing and developing the AMEDD KM program and AMEDD KE system difficult. Other key difficulties included lack of adequate funding and related manpower support. Despite difficulties encountered due to the lack of top-level leadership support in the past, the leaders and the staff of the AMEDD KM effort were very positive that things were changing rapidly for the better. Although no immediate local impact had yet been seen, the Chief of Staff of the Army's August 2001 memo which formally acknowledged the importance of KM to the future of the Army enterprise was a great encouragement to the AMEDD KM staff.[7] It was a positive sign that the high-levels of Army leadership were coming on-line to support KM efforts across the service. Colonel Tefft remarked that she was very optimistic and felt like AMEDD was at the "beginning of a wave." She described how the momentum associated with Army KM efforts had picked up speed during the last year by saying,

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[7] The AMEDD KM staff now has additional reason to be encouraged. During the Apri1 1-5, 2002 Army Knowledge Symposium the AMEDD KE was selected Best Overall Knowledge Management Initiative.

"… in less that a year's time…I went to my first Army Knowledge Online (AKO) meeting and they were…just beginning to get a handle on what knowledge management was all about. And six months later there was a re-thought process and this whole strategic planning thing happened. And they carved out what they were going to do and then they got buy-in from the Chief of Staff of the Army. So we've (now) got that top-level support." The recent addition of the Balanced Scorecard management initiative to the AMEDD KE had also helped to further garner critical support from the Army Surgeon General.

Lack of reinforcing behaviors. The lack of higher-level leadership support did not always help to reinforce new behaviors and inculcate a new KM-oriented culture throughout the AMEDD organization. When presented with critical opportunities to support AMEDD KM efforts, leaders often chose, instead, to support mission-related execution issues. Colonel Hassell described the situation by saying, "…it's been pretty difficult when you [the leadership] have to make a choice between whether you're going to provide treatment to patients with elevated cholesterol or invest in something squishy like knowledge management." Many of the interviewees stated that quantifying the value and contribution of KM to AMEDD had been difficult which, in turn, made it extremely hard to get leadership support.

Closely associated with the mission-related execution issue, was the recognition by the staff that KM initiatives with strategic impact were more able to capture the attention and subsequent support of leadership. Although this was understandable in a resource- constrained environment, it did nothing to encourage the development of

smaller-scope KM projects that are so essential to a grass-roots KM development

philosophy. While AMEDDCS used this knowledge to their advantage by pursuing more

strategic initiatives (which were indeed more beneficial to the larger AMEDD

community), some staff members felt that some equally important and necessary, yet

smaller-scope initiatives, might be overlooked and/or discouraged. The lack of

reinforcing behaviors in this respect was seen as a stumbling block to the incremental

culture change necessary for true adoption of enterprise KM.

Another reason identified for the lack of leadership support and subsequent

reinforcing behaviors was that many "leaders don't feel the pain close to home." In

general, it was seen that these leaders were not personally suffering the consequences of

information overload and/or the inability to find information/knowledge that currently

exists somewhere. Colonel Hassell described the situation by stating,

> "…the corporation at the executive level believes in knowledge management.
> And their principal tool for managing knowledge, [however] is the overworked
> Major. The Major knows the organization, knows who in the organization knows
> what, keeps their (sic) file of information that they need to answer queries…or
> who to go to to get the same information over and over again. But the executive
> leadership has a staff surrounding them that helps to manage…the tremendous
> volumes of information they need. So to some extent, I don't believe they
> necessarily feel the pain of it. They are shielded from the pain. And maybe
> because they don't' feel the pain as much, then maybe they aren't willing to make
> the resources available."

The final evidence offered that demonstrates a lack of KM-reinforcing behaviors by upper management and leadership was the perception of the role of politics and leadership whims related to KM issues. In contrast to a very pragmatic and rational approach to KM systems development and the prioritization for development, many tasks and/or projects were perceived to be assigned/completed based on political interest or the personal whims/desires of influential leaders. Although the staff understood the harsh realities of politics in the military, the inconsistent approach did not reinforce many of the values felt necessary to promote an open, knowledge management-oriented culture.

Coordination Factors

Despite the new enthusiasm and show of support for Army Knowledge Management by the Chief of Staff and Secretary of the Army, no immediate impact had yet been seen at the AMEDDCS level. Coordination with other organizations for philosophical, financial, and human resource support remained challenging at best. In the absence of any high-level policies regarding operational KM implementation, the AMEDD KM staff were left to negotiate the obstacles locally. Two of the toughest coordination issues they had faced in the past, and were still facing, were: 1) the lack of clear lines of authority and tasking for KM-related issues and 2) the existing paradigms and stovepipes associated with the IT/CIO functions.

Lack of clear lines of authority/tasking. The lines of authority and tasking, although very clear within the AMEDDCS, became less clear at higher levels. This situation was evident in the many different and self-acknowledged, unclear responses by interviewees regarding questions about the organization structure, who projects were

completed for, funding sources, etc. According to one respondent's point of view, "…we

fall under the AMEDD Center and School, but the rest of our projects have come from

MEDCOM. And…for the longest [time]---the last year and a half---[we were] really

kind of wavering in the middle. We were just floating around trying to help out any one

of the components that asked." The fact that the AMEDD KM staff was located very far

down in the organization hierarchy, yet supported KM initiatives at all levels of AMEDD

made coordination issues challenging and called for unconventional approaches and

solutions.

Paradigms about the IT/CIO function. Although the Army is attempting to recast

its older IT organization into a more information-centric one by adopting new

philosophies and renaming it CIO, it still remains and is recognized as the technology

organization. The fact that KM philosophy and technology issues, however, are, in many

cases, similar to those dealt with by the CIO organization causes significant confusion.

Coordination problems also arise when the KM program home is a non-CIO organization

like the Center for Healthcare and Education Studies, Leadership and Instructional

Innovations Branch.   Colonel Hassell stated, "…what you are seeing in AMEDD is that

our boss is looking more to the CIO to manage the KM dimension, rather than having a

separate bureaucracy with a CKO and a whole bunch of people." The resultant confusion

and coordination problems as recognized by the AMEDD KM staff include:

- Because the AMEDD IT/CIO organization is an established functional

  stovepipe for information and IT-related activities with an established funding

  stream, leaders in the Office of the Surgeon General and at MEDCOM

habitually turn to the CIO organization to solve KM problems rather than

consulting with the experts in CHES.

- Again, because of the established paradigms about the IT/CIO organization

  the AMEDD KM staff finds itself having to ally with it in order to take

  possible advantage of its exposure level and established funding streams.

- Because the AMEDD IT/CIO organization is not fully aware of the AMEDD

  KM staff's KM knowledge or capabilities, duplication of effort between the

  two organizations is possible.

- The IT/CIO staff is for the most part composed of technologists. These

  technologists have proven themselves in building technical infrastructure

  solutions, but are often not as good at information/knowledge management

  solutions.

Although the coordination problems present a major challenge to deploying knowledge

management solutions, the AMEDD KM staff continues to be optimistic that they will

sort themselves out over time.

Control Factors

A variety of control-related factors were identified by the AMEDD KM staff as

being barriers to their KM effort.

Lack of control of contractors. One of the first control issues discussed by all the

interviewees involved the inability to tightly control or direct the outsourced contractors

who were initially tasked to create the first-generation Knowledge Management Network

(KMN). Many of the interviewees expressed the opinion that the contractors were highly

paid yet produced very little product in return. The fact that the initial visionary for the KMN left mid-stream of the development added to the vacuum of leadership direction with respect to the KM effort and the contractors as well. Colonel Tefft described the resulting situation by saying, "the developmental philosophy and technical application were strongly influenced by the contractor subject matter experts." One staff member conceded, however, that although much of what the outside contractors developed and presented appeared to be "smoke and mirrors" at the time, it was possible that the KM staff's knowledge of KM had not evolved enough to understand it. The difficult and expensive relationship with the initial contractor was seen as a negative influence that thwarted progress. The same experience, however, was also seen in a positive light in that it drove the evolution of the organization as it exists today.

Restrictive impact of external control policies. The existence of external control policies with regard to technical infrastructure issues, software procurement and use standards, and usability issues were often seen as frustrating and often unnecessarily restrictive. The technical infrastructure and software standards policies originated for the most part from the IT/CIO organizations at both the local and higher-levels of the Army organization. Some policies were also downward-directed from the DoD. Although the value of some of these policies (such as security requirements) was recognized, others were hard to implement or, in some cases, inappropriate for the local level. Mr. Daniel Williams, the chief technical developer for the AMEDD KE system stated, "…these people who are writing these policies don't seem to understand how it's being applied in the organization." He further remarked that the policies did not allow the use of new

advances in technology, especially in the areas that he perceived would help enhance KM

system capabilities. As for software procurement and use standards, they were also

limiting. In the case of collaboration software, the available choices had been so poor

that the AMEDD KM staff ended up developing its own, in-house. As for usability

issues, compliance with the federally mandated Section 508 of the Rehabilitation Act

(e.g., graphics without readable text captions) had been a major hurdle for the KM

technical staff. Besides being incredibly time consuming, direction about how to comply

and implement on local websites was confusing. Having been given little notice of

compliance deadlines or previous guidance about compliance considerations, the

AMEDD KM technical staff was forced to work around the clock during the Christmas

holidays of 2001. The re-vamp was so extensive that many portions of the existing

AMEDD KE website had to be discarded and built again from scratch.

Lack of internal control policies. The lack of existing control policies for a

variety of issues had recently become an area of concentration for the AMEDD KM staff.

As the AMEDD KE system and the KM program as a whole had become more robust,

the staff found itself needing to address issues such as content management, sub-site

management, taxonomy development, and overall guidance regarding explicit steps to

transition the organization culture. Although the need for additional policies and

guidance was a natural evolution of the KM effort, the lack of the policies at the local and

higher levels and the need for their development had presented difficult challenges along

the way.

As for content management, the AMEDD KM staff had worked very hard to develop the AMEDD KE system so that component information providers and users could easily update and keep control of their own information. An unfortunate result of this approach was that content and quality management became a bigger issue as the system continued to grow. Although the AMEDD KE staff chose to take responsibility for content and quality oversight (with a staff member assigned to those duties) of the AMEDD KE website as a whole, the process of developing control policies and maintenance agreements and then rallying subsequent support and participation had been challenging. Having never dealt with these issues before, the exact nature of the policy content was unknown as well as the best implementation approach. The AMEDD KM staff's affiliation and working partnership with the American Productivity and Quality Center helped guide them through the process.

A related difficulty had to do with sub-site management. In addition to content and quality issues, the AMEDD KM staff found itself needing educate the sub-site and community managers regarding a variety of topics such as the subtleties of public versus private information. Because the AMEDD KE was a military website, there were concerns about information being made available to the general public. The Knowledge Services director stated that memorandums of agreement (MOAs) were being developed and would be delivered to the community managers and others so that they could become more aware of their responsibilities and restrictions on website content.

Another increasing concern was the lack of an existing taxonomy on which to control and organize the ever-growing amounts of information and knowledge available

through the AMEDD KE system. Even more worrisome was recognition that the

taxonomy should be built at the higher levels of the Army with an enterprise concept in

mind. Colonel Hassell stated, "…our [biggest] problem has been that the corporation has

no taxonomy that supports its categorization of this knowledge. The organization doesn't

realize that it has no overarching schema for categorizing, classifying, and metadata

tagging what it knows. And you can't, quite frankly, organize what you know unless you

have an agreed-upon taxonomy….I think that's going to be the largest barrier." With no

immediate answers in sight, the taxonomy challenge remained an open issue.

Finally, the lack of policies regarding steps for culture transition were mentioned

as a setback. In discussing what might change if the Office of the Surgeon General were

to come on line and say that AMEDD would become a knowledge organization, Colonel

Hassell stated, "What I would like to see is all the policies…that we would need that

would set the framework to transform the culture." The realization that the ability of the

AMEDD KM effort to effect an AMEDD-wide culture change without higher-level

support and policy was frustrating and continued to impact the AMEDD KM staff's

efforts to develop and implement more strategic applications.

Social control. There were very few elements of social control that appeared to

negatively impact the AMEDD KM staff's ability to continue to implement facets of

knowledge management. In fact, the KM staff leaders had been quite resourceful in

making beneficial personnel and organization changes.

Measurement Factors

"Measuring" and/or "valuing" the contribution of KM to the organization was

presented by the interviewees as a relevant concern. The main issues involved

measurements needed for leadership support, the lack of appropriate

measurements/metrics, and the use of metrics for culture change.

Measurements needed to gain leadership support. Although there was no

evidence that leadership levels above CHES had required hard numbers or measurements

to justify continuing the KM effort, some interviewees did indicate that the Surgeon

General was a "numbers kind of guy" and that AMEDD KE website metrics had been

used in the past to demonstrate increased usage levels, etc. From the respondents'

testimony, it appeared the leadership had so far been content with the implicit value of

the AMEDD KE and associated efforts, while expressing an uneasiness that it might not

remain so indefinitely.

Lack of appropriate measurements. In trying to provide quantitative measures of

their success both internally and externally, the AMEDD KM staff constantly struggled

with the lack of appropriate measures. When asked about metrics, Mr. Daniel Williams

stated, "Nobody likes to talk about it because it's the hardest part of what anybody that's

doing (KM) stuff right now seems to be addressing." Like many other organizations, the

AMEDD KM staff used the Webtrends software to track website use statistics such as

number of hits, duration of visits, etc. As the technical expert and the one asked to

implement the metrics generating software tools, Williams further stated, "The problem

is they can't quantify success with what they are doing and they rely on numbers from IT

to somehow show success." Even though the Webtrends statistics were the primary

source of quantitative measurements, the staff and leadership understood its inherent

limitations. A recent addition to the AMEDD KE website, the Knowledge Management

component, attempts to present qualitative examples of success and value to the AMEDD

community through storytelling.

Metrics use as a mechanism for culture change. Two interviewees mentioned the

use of metrics to promote culture change. Specifically, metrics were being used by

supervisors in some instances to monitor and evaluate individual participation and

contribution to the AMEDD KE system and/or communities of practice. Despite the

potential positive impact such actions could effect, the respondents stated that individual

users were very sensitive to monitoring and that such actions could actually have a

negative impact on the intended culture change.

The AMEDD KM case study identifies the variety of managerial influence factors

that acts as barriers to organization KM. Table 10 summarizes these influences.

Table 10. Summary of Managerial Influence Findings for AMEDD

Influence Factor	AMEDD Findings
Leadership	• Lack of leadership commitment at critical levels • Lack of reinforcing behaviors
Coordination	• Lack of clear lines of authority/tasking • Paradigms about the IT/CIO function
Control	• Lack of control of contractors • Restrictive impact of external control policies 　• Technical infrastructure 　• Software procurement/use 　• Section 508 compliance • Lack of internal control policies 　• Content and quality management 　• Sub-site management 　• Taxonomy development 　• Culture transition steps
Measurement	• Measurements needed to gain leadership approval • Lack of appropriate measures • Metrics use as a mechanism for culture change

Resource Influence Factors

The purpose of the second research question was to identify resource influence factors that act as barriers to organizational knowledge management. In investigating the question, financial, human, material, and knowledge resources were addressed.

Financial Resources

Lack of adequate funding. The crux of AMEDD KM staff's resource problems was a consistent lack of adequate funding, especially in light of the expanding scope of the KM program. Colonel Hassell stated, "…if you look at the military health system and you look at the level of funding required to provide health care compared to the actual funding supplied by Congress…there's always been a perennial shortfall of resources." Since the beginning of the KM effort in 1997, funding levels had continued to

decrease. As a point of comparison, the original outsourced contractor was paid one million dollars per year where the in-house contract was now only funded for $200,000 per year for the same type of work. Since 2000, the Center for Healthcare and Education Studies, under the direction of Colonel Hassell, had been the sole provider of funds for the KM effort.[8] In light of reduced funding, the AMEDD KM staff resorted to a variety of resourceful methods to make ends meet. One such method was the institution of a fee-for-service concept, where customers were assisted with KM projects only if they were able to bring money to the table. Due to organization politics, the fee-for-service rule wasn't applied in all cases, but it did help to relieve a small portion of the financial stress. Overall, the lack of funding negatively impacted the AMEDD KM program in that fewer new efforts were initiated, fewer customers were served, fewer software and technical upgrades were purchased, and the number of funded staff positions continued to be limited. The less-than-bright financial future also seemed to dampen the otherwise optimistic viewpoints of many of the staff members and appeared to make them hesitate about making big plans for the future.

Restrictive budgeting environment. The cyclical, inflexible, and long-lead time nature of the military budgeting process negatively impacted the AMEDD KM efforts. Although their sole funding stream came from CHES, they were still subject, only at a lower level, to the fluctuations and constraints of a budgeting process that occurred almost two years earlier. In addition, the functional stovepipe nature of the funding

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[8] The impending reorganization was cause for further budget concerns. The AMEDD KM program "home" and staff were to be moved from the CHES to another organization within the AMEDDCS.

process made it very difficult to establish requirements and receive funding for KM-related efforts in the CHES. Colonel Hassell stated CHES had submitted a Program Objective Memorandum Unfunded Requirement request to hopefully procure funding to support KM efforts. And, although it made it to the highest levels of the Army for approval, in the end it was unfortunately denied. As a result, both Colonel Hassell and Colonel Tefft had seen it become increasingly necessary to ally themselves with the IT/CIO organization, which was recognized for being adequately funded, in hopes of obtaining more funding through partnering. Overall, the funding environment not only made it hard for the AMEDD KM team to maintain adequate funding for its own existing projects, but also made it difficult to pursue more strategic, enterprise-level KM initiatives.

Human Resources

Lack of manpower availability. The lack of adequate funding in many ways contributed to a limited manpower pool for the AMEDD KM program. With a dedicated Knowledge Services staff of only nine, the respondents reported that their "plates were full" with existing projects and other initiatives were on indefinite hold. At one point there had been a plan to hire a new programmer with customer-provided funds. The idea was that the programmer would come in, develop and roll out a project, and then be let go again. The plan was never implemented, but the staff was constantly having to be creative "manpower-wise" while trying to grow AMEDD KE into a more strategic scope while still maintaining the status quo on staff size and workload capability.

Negative impact of turnover. The impact of personnel turnover was also a significant human resource issue. Although frequent turnover of military personnel was an accepted part of the military culture, it nevertheless continued to adversely impact the AMEDD KM efforts and the ability to capture intellectual capital service-wide. The departure of retirement-eligible civil servants was a concern as well. Luckily, due to the fact the Knowledge Services staff consisted of civil service and in-house contract employees only, KM staff turnover was not yet a concern. The critical issue, as identified by Colonel Hassell, was turnover of individuals in key positions. He remarked that there was very little continuity of command. He further explained that,

"…there's very little continuity of leadership because we need to develop our leaders through positions, increasing responsibility and that kind of stuff. But what is sad is, that there's no intellectual basis that perpetuates what the organization learns through those successions. …So to some extent we just…keep living. We never really progress. We just live over and over again the same year or two."

Although personnel turnover thwarted the AMEDD KM efforts by precipitating the need to constantly re-train and re-inform new leaders and key personnel, it also provided the key motivation for continued AMEDD KM efforts.

Lack of KM knowledge, expertise and skill. Many of the Knowledge Services staff members openly admitted that they had never heard of knowledge management until they came to occupy their current positions. The same was true of a majority of the AMEDD staff, Army leadership, and the Army population at large. For the most part,

knowledge management had not been a part of the Army vocabulary until it began to be

popularized in late 2001. The lack of KM expertise, knowledge, and skill adversely

impacted the AMEDD KM effort in two ways. First, it made it hard for the staff to

communicate effectively with their sub-site managers and others who were required to be

integral to the AMEDD KE project. Second, it made it extremely difficult to "sell" the

KM concept to leadership and those on the outside. As an example, Ms. Conklin, the

Knowledge Services Chief, described a briefing in which she was to present some very

basic knowledge management concepts to a supposedly very well-educated and high-

level crowd of international students and Army officers. She started the briefing with the

question, "How many of you have heard of knowledge management?" When not a single

person raised their hand she was dumbfounded. At that very point she describes, "…that

was a kind of a "ah-ha" moment for me, when none of them knew anything about

knowledge management at all."

Another interesting issue associated with the lack of KM expertise and skill noted

by respondents was the challenges of dealing with very IT-oriented personnel. Whether

persons worked within the KM staff, on the IT/CIO staff, or elsewhere, communicating

the true concepts and objectives of KM was often difficult. One respondent attributed the

difficulties to IT people understanding the technologies and not the processes. Another

respondent felt it might have to do with educational backgrounds. Specifically, it had

been one's experience that those with backgrounds of education and training seemed

more prepared to discuss knowledge issues than those who grew up in IT.

Material Resources

  Technical infrastructure challenges. Ahead of its time, the first-generation KMN

was developed and operated totally outside the standard Army IT infrastructure. In the

words of Lynne Conklin, "…we were running independently—we were outside---we had

our own everything." Accordingly, because the distance learning program was such a

large component of KMN early on, the choice had been made to make the server a part of

the .edu domain in order to make access easier for those students located across the

country/world. Despite this initial technical set-up, the underlying Army-wide technical

infrastructure continued to evolve. As time passed, more and more configuration and

network control was exercised by the local IT organization. Eventually, the KMN server

was moved under the .mil domain and all the applicable rules and regulations were

applied to its operation. The physical location of the KMN server was also bounced

around to the Ft. Sam Houston installation server farm and back to the local IT

organization. These major changes caused confusion and accessibility problems for

customers as well as reconfiguration work for the AMEDD KM staff. Although

customers eventually adjusted to the new way of doing business, accessibility still

remains an intermittent problem. Mr. Arnie Saunders, who was guiding an e-learning

initiative, stated that the AMEDD KE integration into the local IT infrastructure along

with the increased security requirements (i.e. secure server platform and secure pipes in

and out of the base) appeared to sometimes slow down traffic and make it difficult for

people to reach the server from outside Ft. Sam Houston.

Lack of KM software choices. The availability and quality of existing

collaboration software made it difficult to establish a robust discussion tool for the

AMEDD KE. Initially the KM staff used a solution called Webboard, which was a

collaboration tool for asynchronous discussion. The product did not perform very well

and was eventually determined to be "not authorized for use" within the DoD. In the

process of searching for an affordable, substitute product, the KM technical staff

approached the leadership about developing an application in-house. Without many other

choices, the leadership agreed. Eventually the collaboration product, now called

AMEDD Synergy, was developed in-house and has performed extremely well. There

remain concerns, however, regarding the manpower required for its long-term

maintenance.

Challenges of technology evolution. The AMEDD KM team was constantly faced

with the challenges of technology evolution. Although the technical team was very adept

at responding to the fast-paced changes in technology, they were still limited by the funds

to procure the latest technologies and upgrades and the time needed to implement

changes. Mr. Daniel Williams stated, "…a good example of that would be that we're

starting collect more data….and we need a more robust server than Microsoft SQL. So

we're examining Oracle. But because of the cost of Oracle…[it's not] financially

viable." Some of the respondents felt that the inability to procure the latest advances in

software, equipment, etc. drove the organization to develop less-than-leading edge

products that could not support the KM objectives in the best manner possible.

Knowledge Resources

Human knowledge resources. Human knowledge resources are described by

Holsapple and Joshi as the "raw materials" for knowledge activities (2000. P.241).   The

existence of human knowledge resources throughout the AMEDD was extensive. The

negative influences of these knowledge resources on the KM effort are described below.

Lack of tacit knowledge capture. The majority of knowledge stores existed as tacit

knowledge locked in the minds of AMEDD workers. The impact of the impending brain

drain caused by the upcoming mass retirement of civil service employees and the

standard turnover of other staff members had long been recognized. Nevertheless,

systems, either technical or process-based, had not been developed to specifically address

tacit knowledge capture. Many of the respondents recognized the difficulty associated

with tacit knowledge capture—technical systems were difficult to build, and it was even

harder to get individuals to "brain dump" to them. Colonel Hassell remarked that

alternative mechanisms, such as mentoring or on-the-job training, should be put in order

until a technology "that lets us impart our knowledge and be instantly re-impartable to

someone else" was developed.

Incompatible/Inaccessible knowledge/information stores. For those electronic

stores of information and knowledge that did exist within the AMEDD, much of it was

trapped in legacy systems or in applications that were incompatible with new systems.

As a result, much historical information could not be made available through the

AMEDD KE or other KM-supportive systems. The inability to capture this information

and knowledge for future use was indicative of why the KM program was initially begun

and remained a challenge.

Lack of "knowledge about knowledge management". Although the lack of

"knowledge about knowledge management" was pervasive through many organizations

in AMEDD and the Army, its impact was seen close to home in the early days of the

AMEDD KM effort. As stated earlier, the original work on KMN was completely

outsourced to contractors. After the initial visionary leadership departed, the KM effort

floundered. The vacuum created by the departure of KM-knowledgeable leadership

allowed the contract to continue relatively unguided for quite some time. As a result,

money was expended for very little product in return. Although the situation was

eventually corrected with the arrival of new, knowledgeable leadership, the organization

experienced a hard lesson learned. Respondents stated that outsourcing should not be

considered an option when no internal expertise exists in-house. Colonel Hassell further

remarked that contracting out does not facilitate the essential process of "learning by

doing".

Lack of knowledge about organization KM strategy. Human knowledge of

organization strategy is a knowledge resource that does impact organizational knowledge

management efforts. Within CHES and LIIB, the organization strategy for the

conceptual and physical implementation of KM was well known. The KM staff's efforts

were hampered, however, by the low-visibility and/or non-existence of higher-level

AMEDD and Army strategies for knowledge management. This low-visibility

contributed to the impression that the KM effort was just a local project and did not help

potential customers, users, or KM converts to understand how the AMEDD KM efforts undergirded the objectives of the Army transformation effort and the transition to a true learning organization.

Lack of knowledge about KM–supportive organization culture. Despite the lack of top-level support, the AMEDD KM staff and leadership had made great strides in transforming the AMEDDCS organization to a knowledge-sharing/knowledge management-oriented culture. Resistance to change and the slow adaptation of a KM-supportive culture, however, continued to be a challenge. Colonel Hassell stated, "…no amount of money is going to speed up that process [of] cultural adaptation. Some things are just going to take time because people change at the rate at which they're going to change. Some people will be left behind. Others will adopt early, but that's human cultural adaptation."

Another element of cultural adaptation identified by respondents was the necessary evolution of individuals' KM-related vocabulary. The incomplete grasp of KM concepts was repeatedly demonstrated with KM being confused with information management (IM). Although the two concepts are very similar in many respects, KM is definitely the higher-level concept. Furthermore, any discussion of knowledge management has its own language. It requires the use of a variety of uncommon terms, such as "communities of practice" and "virtual collaboration", which are unfamiliar to the average individual. The respondents suggested that until these individuals develop an understanding of the KM language, it is impossible for them to understand, support, and evolve to a KM-supportive culture.

Overall, the AMEDD KM case study indicates that there are a variety of resource influence factors that acts as barriers to organization KM. Table 11 below summarizes these influences.

Table 11. Summary of Resource Influence Findings for AMEDD

Influence Factor	AMEDD Findings
Financial	• Lack of adequate funding • Restrictive budgeting environment
Human	• Lack of manpower availability • Negative impact of personnel turnover • Lack of KM knowledge, expertise, and skill
Material	• Technical infrastructure challenges • Lack of KM software choices • Challenges of technology evolution
Knowledge	• Lack of tacit knowledge capture • Incompatible knowledge/information stores • Lack of "knowledge about knowledge management" • Lack of knowledge about organization KM strategy • Lack of knowledge about KM-supportive culture

Environmental Influence Factors

The purpose of the environmental influence factor category according to Holsapple and Joshi (2000) is to capture and separate those influences that are external to the organization being examined. For the purposes of this research, the definition of "external" was defined as outside the confines of the immediate KM program organization. In the case of a large military organization such as the Army, influences at the major command levels and higher can be considered external to smaller, far-removed organizations such as the AMEDDCS. The influences discussed below were considered external to the central KM organization—the LIIB, but all weren't necessarily external to the Army as a whole.

GEPSE Climate

The GEPSE (governmental, economic, political, social, and educational) climate ultimately impacts all aspects of the military organization. The influences of this climate are passed on to the military through political channels as well through military leadership and the individuals who serve. Recognition of these influences, however, at the lower levels of the organization hierarchy is almost non-existent. In the case of the AMEDD KM staff respondents, the impact of these influences were seen to be much more indirect than direct.

Negative impact of politics. The influence of national politics on the military, the AMEDD, or otherwise, was rarely mentioned. However, the resultant reductions to the military budget, especially the military healthcare portions, were accepted as an indirect impact. The influence of internal organizational politics was mentioned much more frequently. As described by the respondents, internal politics (at various levels within the Army and AMEDD) had negatively impacted the KM efforts in the following ways.

1) Many projects were prioritized and accepted for work based on political influence rather than need or overall contribution potential.

2) Some leaders did not like to support KM because it was risky and unpopular.

3) Critical choices regarding software and technical infrastructure were influenced by leaders' whims instead of factual comparisons

Increased security climate. The events of September 11, 2001 only served to heighten awareness in an already vigilant security climate. Over the past few years, the military has made a concerted effort to increase the security of all installation computer

systems and networks so increased security is no surprise. Some respondents stated, however, that the additional security mechanisms appear to have slowed down the network at times. Others admitted that compliance with additional security requirement policies had required a good amount of work above and beyond their normal tasks.

Negative images of KM. The negative images of KM portrayed in the press and through failed claims of consultants did nothing to aid the AMEDD KM efforts. The media hype and the suspicion by many (leaders included) that KM was just the latest management fad was an obstacle hard to overcome. Some members of the AMEDD KM staff even suggested that they were not sure KM was here to stay. As such, they had made every effort to keep their organization flexible so it could survive in the event some new concept came along and replaced.

KM organization structure implications. A unique environmental factor identified was the influence of organization structure. The fact that the KM program home was situated at the lower levels of the AMEDD (and Army) organization negatively impacted the visibility of the KM program staff and efforts. Chain of command issues also made it very difficult to pursue and execute strategic initiatives that reached outside of CHES. Overall, the military-centered cultural expectations and paradigms about lines of authority and organization hierarchy somewhat stifled the AMEDD KM program's process. The fact that the AMEDD KM program staff belonged to a non-IT organization was also a drawback with respect to funding and program recognition.

Negative impact of "stovepiped" culture. Closely related to the organization structure influences were the influences of the functional stovepipe mindset. All of the

services, including the Army, operate in a very stovepiped manner, especially with

regards to funding and requirements analysis. The negative impact of this kind of

stovepiped mentality for the AMEDD was that it thwarted efforts to cross organizational

lines for broader reaching initiatives. Given that essence of KM is all about crossing

organization boundaries to share knowledge, changing that mindset is the challenge

ahead.

Technology

     Negative impact of rapidly changing technology. For the most part, technological

advances had benefited the AMEDD KM effort (through the IT/CIO organization) by

creating a more robust and reliable network and system infrastructure. However, many

aspects of technology that the KM staff was concerned with continued to change at such

a pace that it was hard to keep up, especially in light of funding constraints. Technology

advancements also tempted individuals throughout the chain of command to want 'the

latest and greatest" equipment and or features. Many of these requests had to be

evaluated which further tied up scarce resources.

Time

     Lack of time. All of the respondents stated in one manner or another that the lack

of "time" negatively impacted their KM efforts. Time has acted as a barrier to KM in

that that there seems to be less and less time to tackle new initiatives, develop new

systems, capture individuals' attention about new concepts, and to experiment with new

ways of doing business. To add to that frustration, today's customer expectations

regarding turnaround times are extremely high.

The AMEDD KM case study indicates there are a variety of environmental influence factors that acts as barriers to organization KM. Table 12 below summarizes these influences.

Table 12. Summary of Environmental Influence Findings for AMEDD

Influence Factor	AMEDD Findings
GEPSE Climate	• Negative impact of politics • Increased security climate • Negative images of KM • Organization structure implications • Negative impact of stovepiped culture
Technology	• Negative impact of rapidly changing technology
Competition/Fashion	• N/A
Time	• Lack of time

Summary of Influence Factors for AMEDD

In summary, this chapter has presented the findings from the case study of the Leadership and Instructional Innovations Branch of the AMEDD Center and School, Center for Healthcare and Education Studies. Using Holsapple and Joshi's (2000) framework as a guide, the three classes of influence factors—managerial, resource, and environmental—have been examined. The findings suggest that a variety of influence factors act as barriers to implementing and executing organization knowledge management. Some findings are particularly unique to the military. These findings are compared to five additional case studies.

CHAPTER SIX—AF OPERATIONAL TEST AND EVALUATION CENTER[9]

Organization and KM Program Profile

Organization Structure and Mission

The Air Force Operational Test and Evaluation Center (AFOTEC) is a direct reporting unit to the Air Force Chief of Staff. In this capacity, AFOTEC reports to the chief of staff, through the Test and Evaluation directorate (see Figure 28[10]), regarding the test and evaluation of 250 major programs being assessed at 22 different locations.
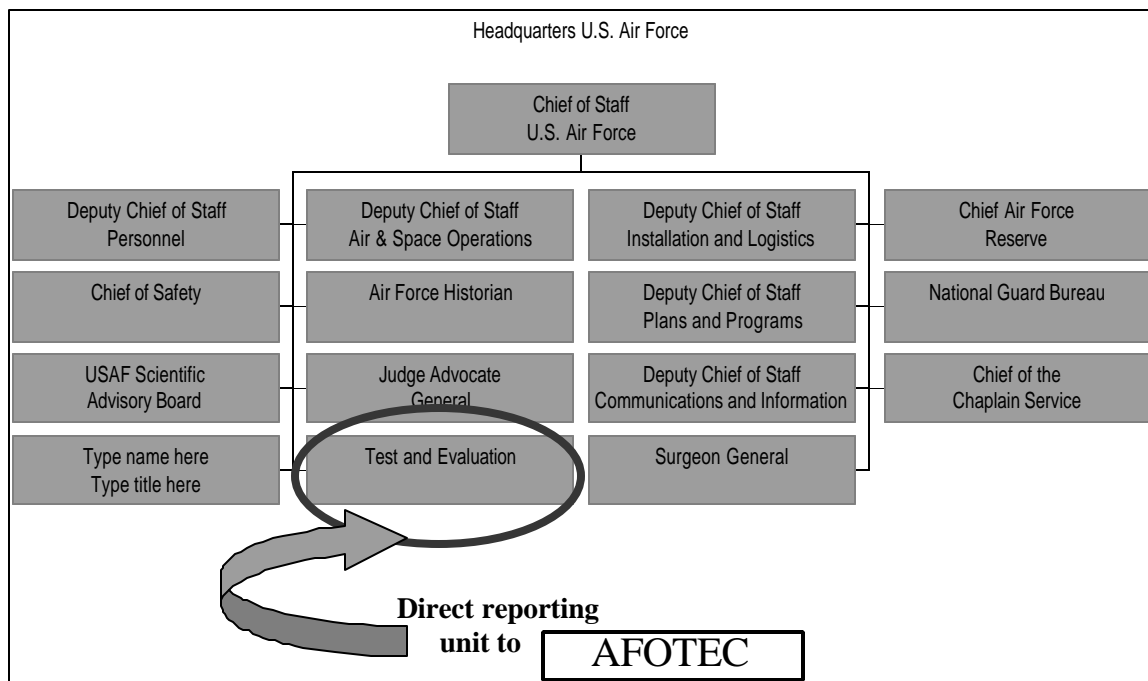
Figure 28. AFOTEC Reporting Structure

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[9] Information for this case, except where stated otherwise, is based on inteviews conducted March 18-21, 2002, at AFOTEC.

[10] This organization chart does not reflect the updates as a result of the Dec. 18, 2002 Headquarters Air Force transformation announced by the Secretary and Chief of Staff of the AF. Forward Operating Agencies are excluded for simplification purposes.

Established in 1974, AFOTEC has its roots in problems encountered with American

combat arms deployed to Southeast Asia in the period 1965 through 1970. According the

AFOTEC website (www.afotec.af.mil), Department of Defense (DoD) studies indicated that

21 of 22 major systems examined suffered major deficiencies in the field. Since that

time, AFOTEC's mission "has been to plan and conduct realistic, objective, and impartial

operational test and evaluation to determine the operational effectiveness and suitability

of Air Force systems and their capacity to meet mission needs. Events observed during

Operation DESERT STORM proved that AFOTEC had accomplished its mission. In its

final report to Congress on the Gulf War, the DoD reported that 21 out of 22 systems

studied performed their mission without any critical shortcomings. AFOTEC had tested

17 of the systems studied and all 17 were included on the list of successful systems

(www.afotec.af.mil/text/history.shtml, retrieved March 13, 2002). AFOTEC employs more than

800 civilian and military personnel who are primarily assigned to one of 4 geographic

locations (Figure 29).
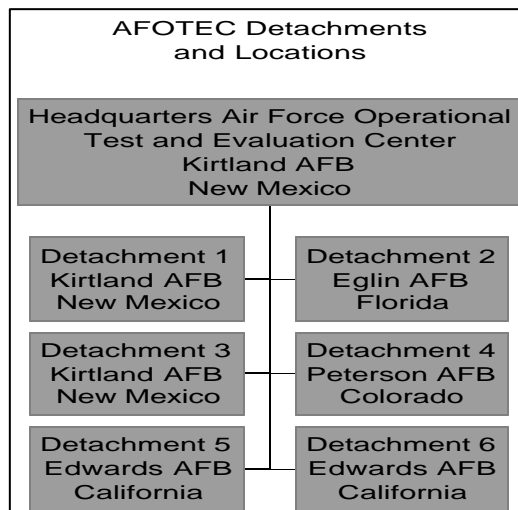
Figure 29. AFOTEC Detachments and Locations

AFOTEC KM Program "Home"

AFOTEC's central governing organization, Headquarters AFOTEC, consists of

all the functional areas that provide support for the Center's organizations (Figure 30).
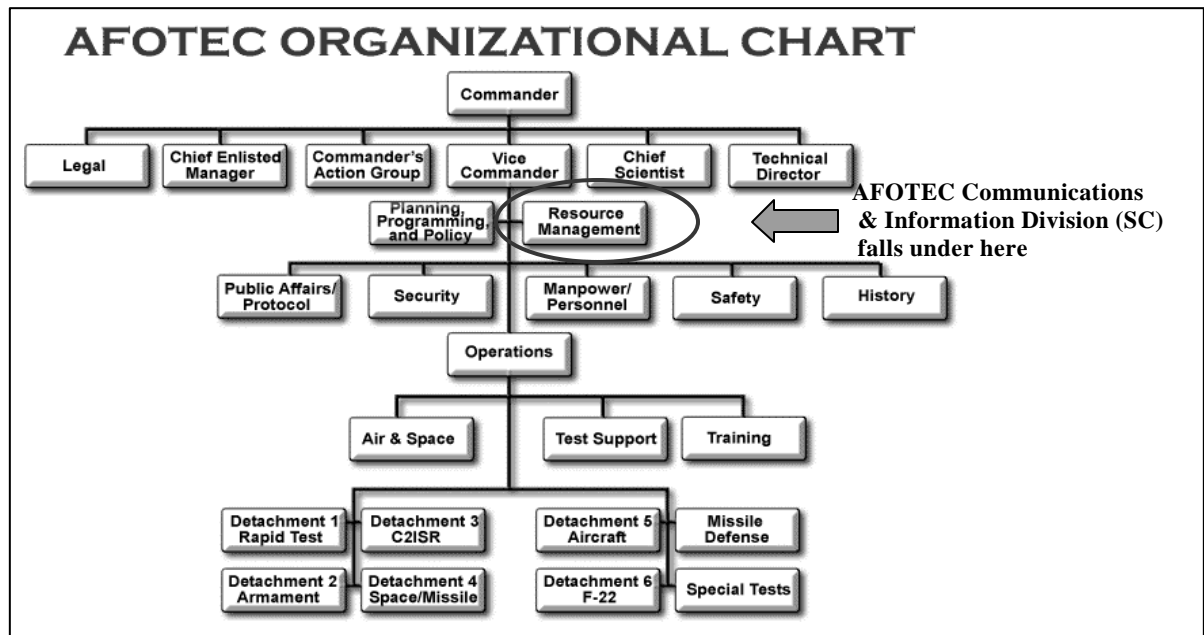
Figure 30. AFOTEC Organizational Chart

The Resource Management and Support Directorate identifies, programs, budgets,

acquires, and manages resources required to support the AFOTEC mission. It also acts as

the local focal point for coordination and programming of resources used to support

AFOTEC operations and Air Force-directed Operational Test and Evaluation programs.

The Communications and Information Division falls under the Resource Management

Directorate and is composed of many of the classic communications and information

functions (Figure 31). It is also the home of the AFOTEC KM program.

AFOTEC Communications and Information Division (SC)

Communications and
Information Officer
(Mr. Bill Becker)

Deputy Chief
Information Officer

Administration	Project Management
Mission Support	Special Projects Officer
Engineering	Detachment 2
Management Information Network (MIN)	Detachment 4
SC Operations	Detachment 5
Plans and Financial Management	
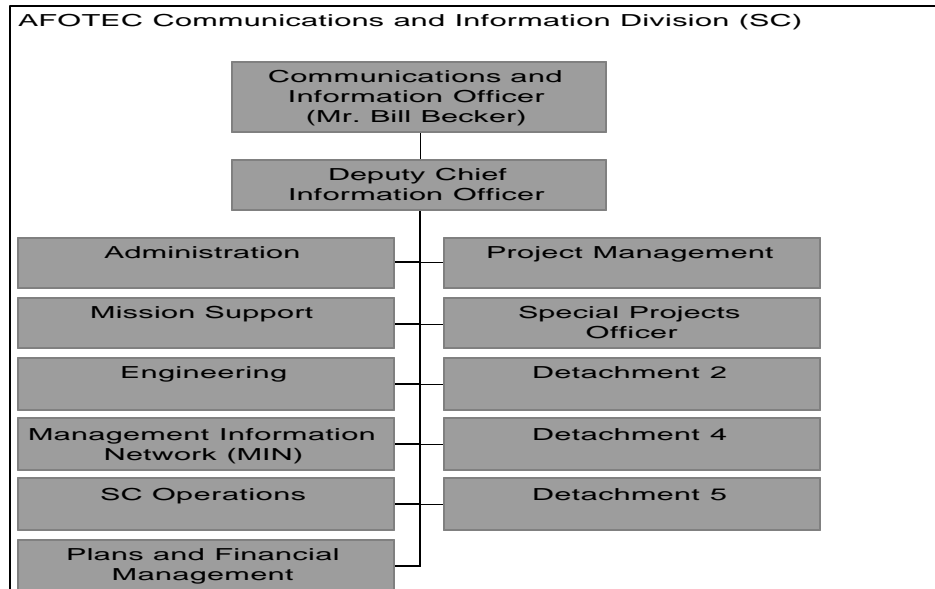
Figure 31. AFOTEC Communications and Information Division (SC)

The AFOTEC KM program team is composed of individuals from various functions
(Figure 32) within the Communications and Information Division.

Location of KM Program Support from Within AFOTEC SC

Communications and
Information Officer
(Mr. Bill Becker)

Deputy Chief
Coomunications and Information Officer

KM Program Team

Administration	Project Management
Mission Support	Special Projects Officer
Engineering	Detachment 2
Management Information Network (MIN)	Detachment 4
SC Operations	Detachment 5
Plans and Financial Management	

Figure 32. Location of KM Support from Within AFOTEC SC

History

The AFOTEC KM program has been evolving since 1994. In its earliest form, it was an effort to design a system/database to help streamline the workload and reduce the preparation time for information that was fed to quarterly commander's calls. At that time, test program managers spent enormous amounts of time preparing briefings (which included duplicated data) only to have them revised again and again up as they passed through the approval channels. As the program level increased, program managers began to spend more and more of their time preparing these briefings, and less time doing their primary duties. Mr. Bill Becker, the Chief of the Communications and Information Division (SC) stated, "So [it] became a full-time multiple position task. All of a sudden nobody was managing the task." Finally, the General in charge of AFOTEC realized this was no way to do business. He then turned to Mr. Becker, who was the SC technical advisor at the time, and stated, "There's got to be a better way…find it." And so the AFOTEC KM effort was born.

With definitive direction and permission, the SC staff went looking for a technical solution. After looking at other organizations and offerings on the open market, they still could not find an application that fit their purpose. As a result they began their own efforts using Visual Basic. This effort was very frustrating as they hit roadblock after roadblock. One especially challenging aspect of the effort was the need for connectivity. Because of the geographically separated nature of the AFOTEC organization, connectivity was key to any improvement. After much pondering and consulting amongst themselves and other experts they decided to use the Internet as the platform and a

browser as the access tool. This occurred in the early days of the Internet growth (1995-1996) so many issues were yet to be resolved. One special concern for the AFOTEC SC staff was security. Because of Title 10 issues and the need to sequester Operational Test and Evaluation (OT&E) data, security of information was essential. Still, even with a general direction, the technical implementation did not go well. Available technology at the time simply did not allow for the robust or secure system that AFOTEC needed. The KM program team (which consisted of two individuals in 1997) decided, yet again, to start over and look for the technology that allowed them to do what they wanted.

In the meantime, however, the same General that had told them to find a solution two years earlier was becoming impatient. At that point, in order to show progress, the KM team decided to implement a high-impact product—a web-based, automated staff directory. This directory included pictures of individuals, phone numbers, organizational charts, etc. It was also designed so that the individuals themselves were responsible for most of their own information. This application was a big hit and, as a result, opened the door for many future applications.

Although this particular effort was not associated with the concepts of KM early on, the seeds that were planted started a culture change and an organization-wide migration towards KM concepts. Since 1998, the KM program team has continued to build KM applications that serve a variety of purposes and customers. In fact, compared to many other military KM initiatives which are in their infancy, the AFOTEC KM program has had the opportunity to mature and is, on the whole very robust.

AFOTEC KM Vision

Given that there was no existing AF-level KM vision or strategy, AFOTEC

developed its own over time. Although not stated as a separate vision apart from the SC

or AFOTEC strategy, the purpose of the KM system is described as:

> An integrated knowledge architecture with data driven functionality, creating
>
> accessible intellectual capital, employing comprehensive data ownership and
>
> security in a user-friendly environment (Becker, 2002).

As AFOTEC's IT organization, the Communications and Information Division is

specifically focused on the technology aspect of the KM program. This does not mean,

however, that they are not keenly aware of the soft issues that are essential to any

organization KM program.

AFOTEC KM System

The AFOTEC KM System, nicknamed the Management Information Network

(MIN) or Infonet, was founded and has since grown based on a few simple principles.

Although the KM program team openly admits that the majority of the MIN currently

focuses on "information" as opposed to "knowledge", but the team expects it will evolve

to such in time. As currently stated, the requirement for a knowledge/information

management system is one that provides value added information availability,

accessibility, and utility. The system should save everyone time and effort and take

advantage of web-based technology and commercial-off-the-shelf software. It must also

be easy to use and maintain (Becker, 2002). The stated objective of the system is to

provide "the *right* information at the *right* time, disseminated and displayed in the *right*

way…so leaders can do the *right* things at the *right* time in the *right* way" (Becker,

2002). Finally, the specific goals for the MIN are to:

- Reduce the commander's time to decision

- Fulfill AFOTEC's information needs

- Solve operational problems

- Reduce operational costs

- Provide for future growth potential

- Be an enabler to other efforts

- Provide goal-oriented vision with task specific, prioritized details

All in all, the MIN is described as an active knowledge management method/tool for

optimal utilization of information and knowledge, which provides automated knowledge

retrieval to staff and decision makers. The aim is to have the information and knowledge

retrieved be relevant, timely, appropriately formatted, at the appropriate level of detail,

targeted at the right user, and accurate (Becker, 2002).

The technical infrastructure of the AFOTEC KM system is complex. It includes

the use of multiple redundant servers with worldwide connectivity provided by the

Internet, extranet, dial-up connections, dedicated links, and soon-to-be wireless solutions.

The critical need to address security issues, geographic separation, and high-bandwidth

requirements forces the AFOTEC KM program staff and AFOTEC technical engineers to

develop leading edge technical solutions—some not yet seen by private industry.

Additionally, the usability issues seen as central in the development of the KM system include:

- Point and click design

- Adaptable, portable, and scalable

- Video, audio, and data conferencing capability

- Quick and easy to build and maintain

By applying evolving technical solutions and basic design principles, the AFOTEC KM system continues to evolve. The following section will describe the MIN as it exists today.

AFOTEC KM System Components

The AFOTEC KM system (or MIN) uses a central website (http://www.afotec.af.mil) as its portal. Authorized users can delve further into the system through the local intranet or extranet connections. Specifically, the MIN homepage (Figure 33) acts as a central hub for access to a variety of functions that include: the Operations Center, AFOTEC Test Programs, staff directory, AFOTEC organization website portal, History and Research Directorate, information assistant, and AFOTEC public graphics site (Figure 34).
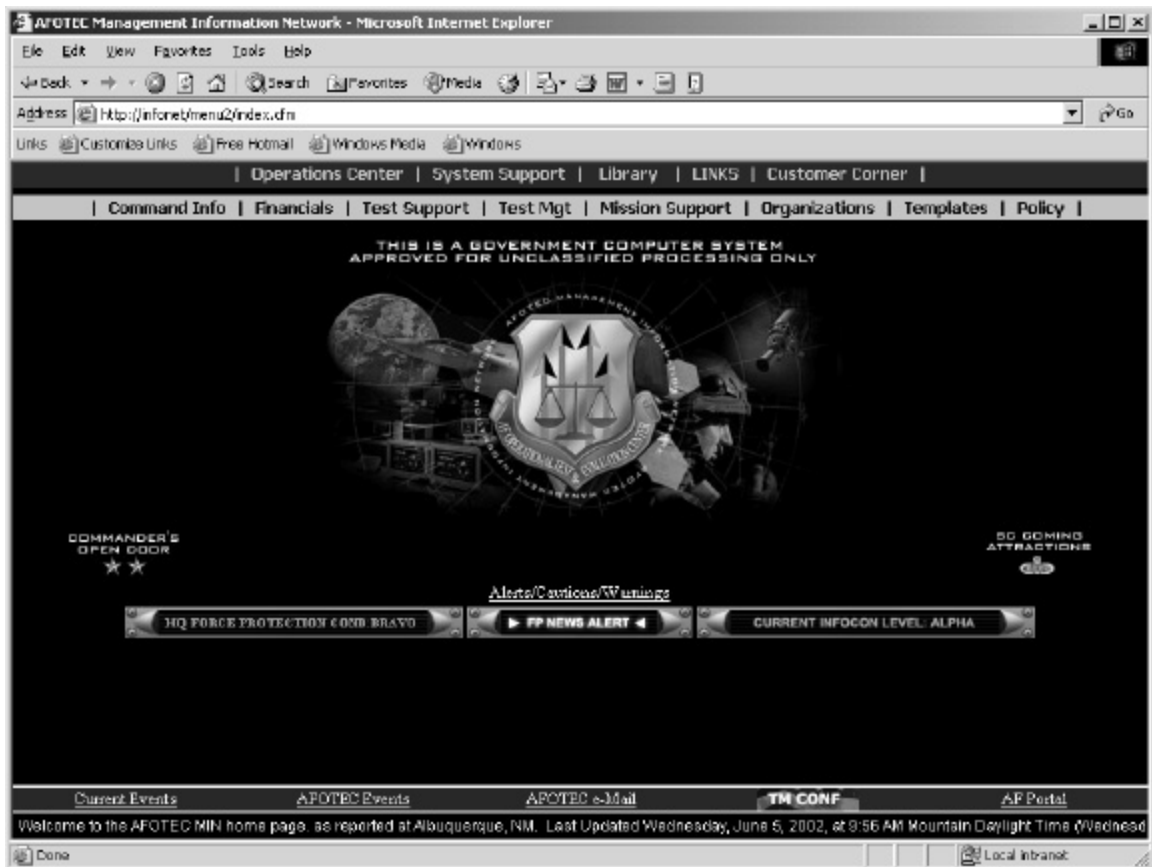
Figure 33. The Management Information Network Homepage
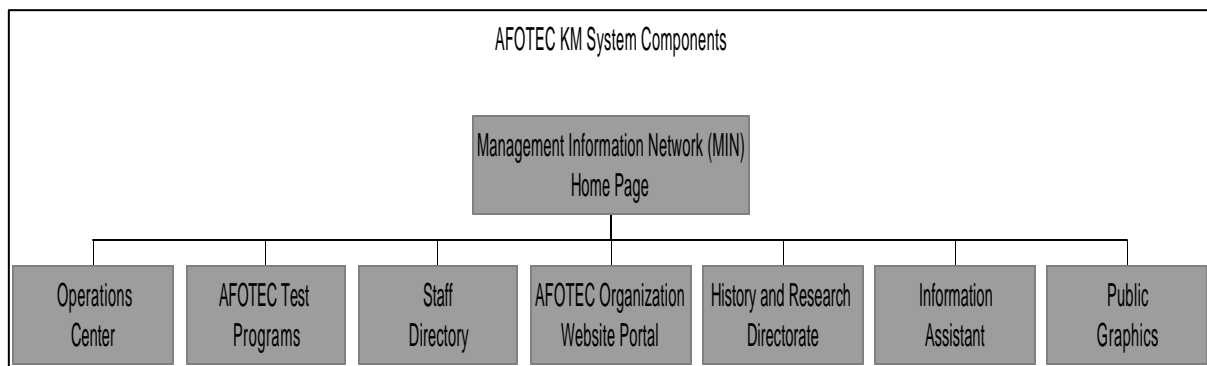
Figure 34. AFOTEC KM System Components

Each of the components serves a different purpose in the spectrum of the AFOTEC KM

system. The following is a brief description of each as currently described on the

AFOTEC website.

Operations Center

The Operations Center (Figure 35) is AFOTEC's core information service for

displaying up to the minute status on test programs, situational awareness on current

Information Condition (INFOCON) and Force Protection Condition levels as well as

local and national news feeds including streaming news and video. Test Managers utilize

the Ops Center's point and click information availability. This component uses a popular

"heads up" display screen as the interface.

Figure 35. Operations Center Component

AFOTEC Test Programs

      The primary focus of the AFOTEC mission is to support its test programs and test managers. The AFOTEC Test Programs component (Figure 36) does just that. The Test Management pages allow test managers to view, change, submit, reply and study test and evaluation documents from all over AFOTEC.

Figure 36. AFOTEC Test Programs Component

Staff Directory

The Staff Directory (Figure 37) allows users to search for AFOTEC personnel

using a variety of criteria. Searches can be performed by name, rank, directorate, etc.

Figure 37. Staff Directory Component

AFOTEC Organization Website Portal

The AFOTEC Organization website portal (Figure 38) is an entry point to all the websites of the high-level AFOTEC organizations. Each link connects to organization and mission-specific sites and documents.
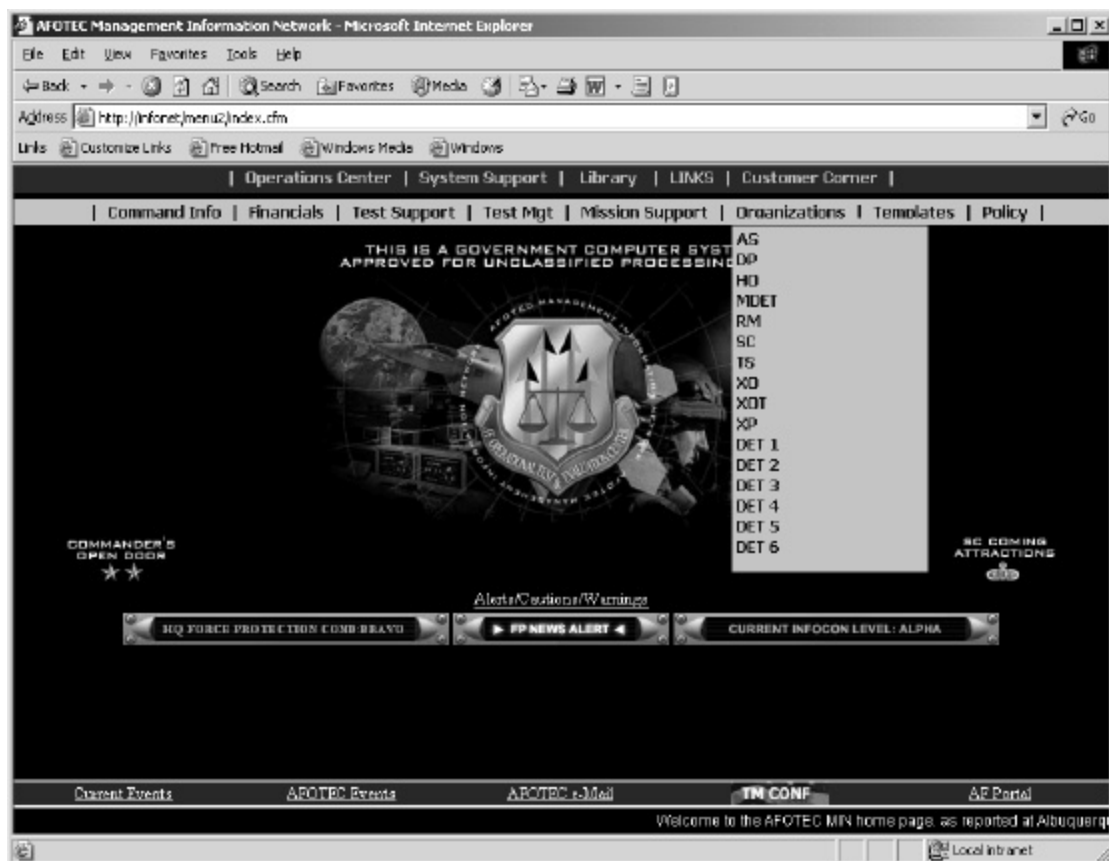
Figure 38. AFOTEC Organization Website Portal

History and Research Component

The historical archiving of previous test procedures and results is a critical part of

the AFOTEC mission. The History and Research Directorate component (Figure 39) of

the MIN gives customers access to an online multimedia gallery and extensive archival

data. This component also provides access to the Operational Test & Evaluation

catalogue.
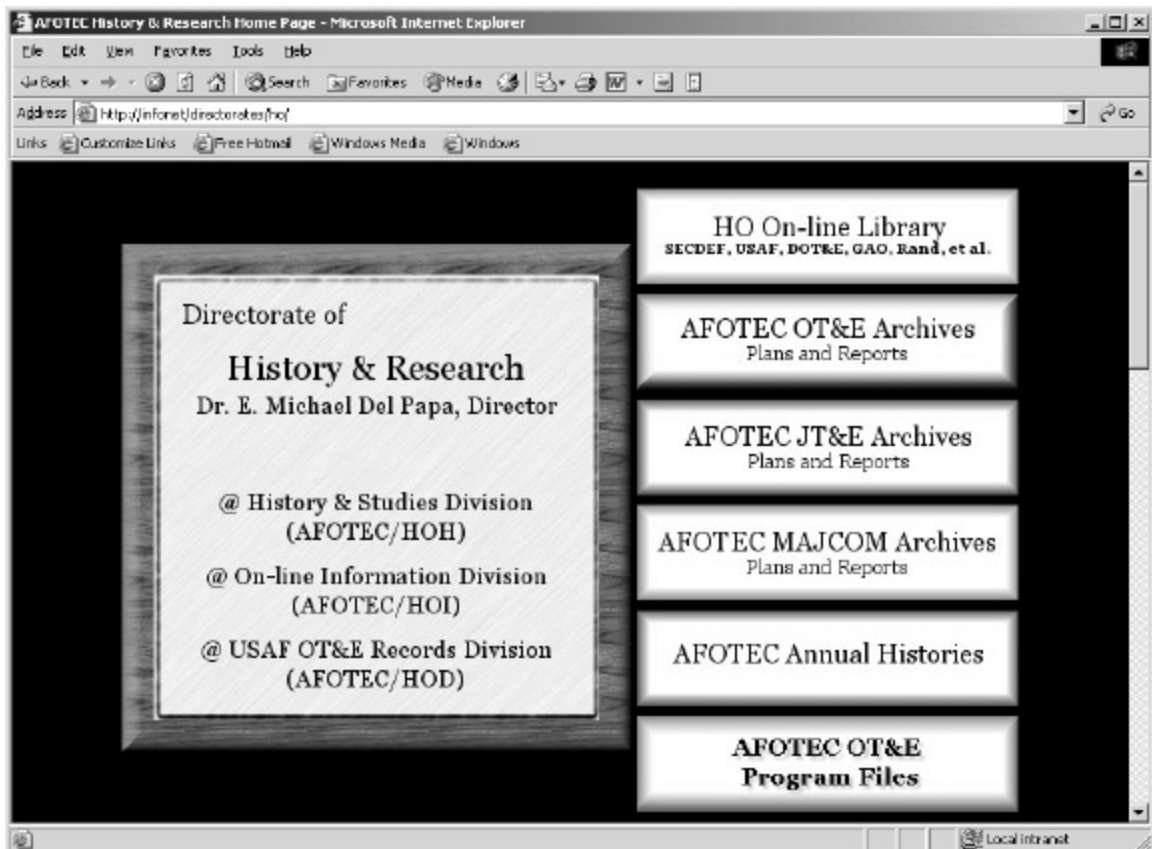
Figure 39. History and Research Component

Information Assistant

The Information Assistant component (Figure 40) provides customers quick links to programs in the test phase and information about their current status. This component was designed specifically to assist test managers in keeping abreast of all aspects of their test program.
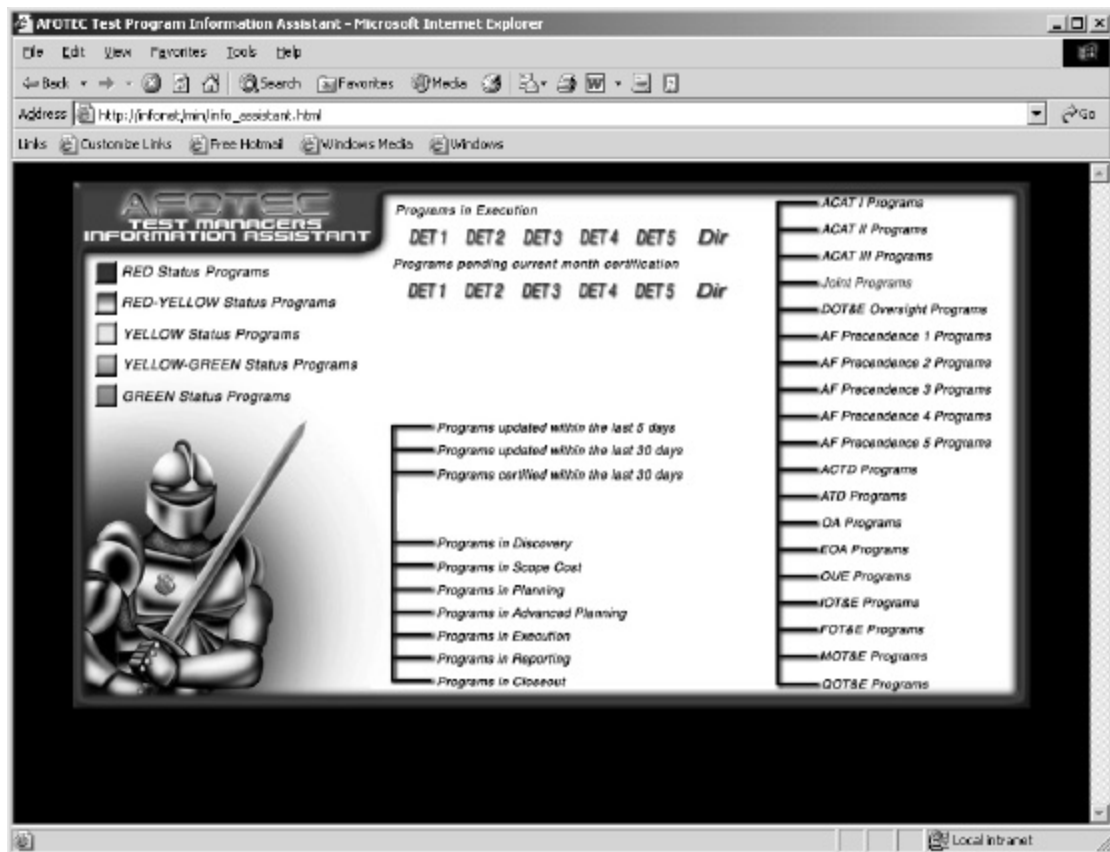
Figure 40. Information Assistant Component

AFOTEC Public Graphics Site

The Public Graphics component (Figure 41) provides a centralized point for collection and access to commonly used graphics. The graphics include officially approved badges, shields, and other images frequently used in presentations, test reports, and many other AFOTEC documents.
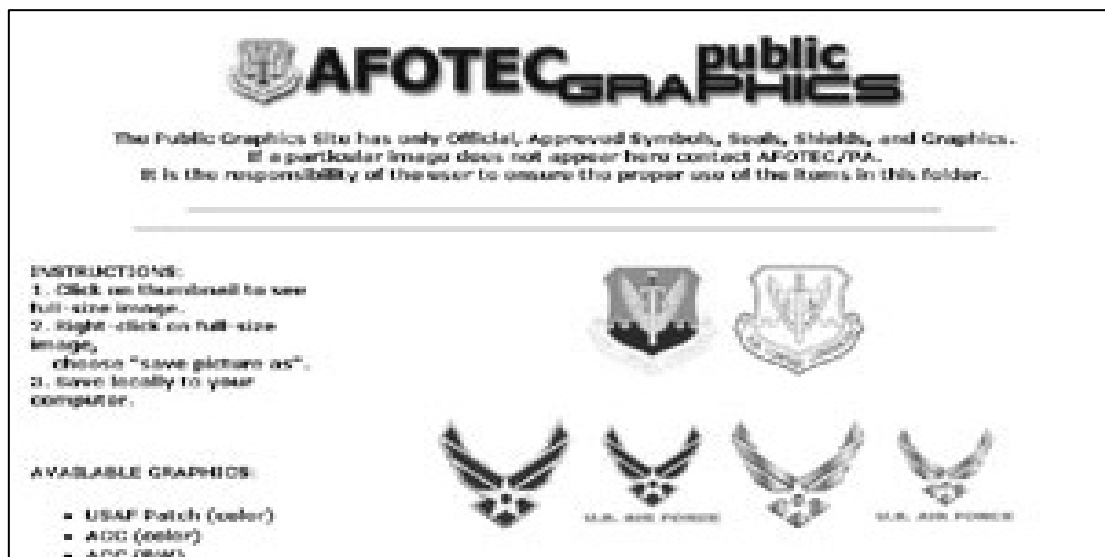
Figure 41. AFOTEC Public Graphics Component

AFOTEC KM Program Team

The KM program team began, inauspiciously, with two individuals—a civil service employee and an Air Force master sergeant-- looking for a solution to the "General's tasker". Around 1998, after the first big success with the staff directory effort, these two individuals along with Mr. Becker (who had subsequently been promoted to the Chief of the Communications and Information Directorate) realized that the staff needed to grow if the efforts were to continue. Besides personally witnessing a

workload increase, they concurred with some recent conference presentations that stressed a team approach to building KM applications.

The team was initially expanded by one individual coming from an in-house contract. This individual was known as an Internet technologies expert and would provide critical knowledge to the team. Not long after, another in-house contractor was added— a database expert. As the team began to form, it became apparent to the existing members that proper team skills composure was essential to a robust technical capability. Over time and with the SC's, Mr. Becker's, approval, the team membership was further expanded, using more in-house contractors. Using a unique base-wide services support contract vehicle, Mr. Becker was able to eventually arrange for a total of five in-house contractors to support the AFOTEC KM effort. The composition of the team as it exists today is shown in Figure 42 below.

KM Program Team Composition

Management Information Network
Contractor Lead/Mgr
(1--in-house contractor)

Programmer/Coding
(1--in-house contractor)

Systems Integration Specialist/
Subsite mgr
(1--in-house contractor)

Graphic Artist
(1--in-house contractor)

Database Specialist
(1--in-house contractor)

Network/Systems
Engineering Specialist
(1--civil service)
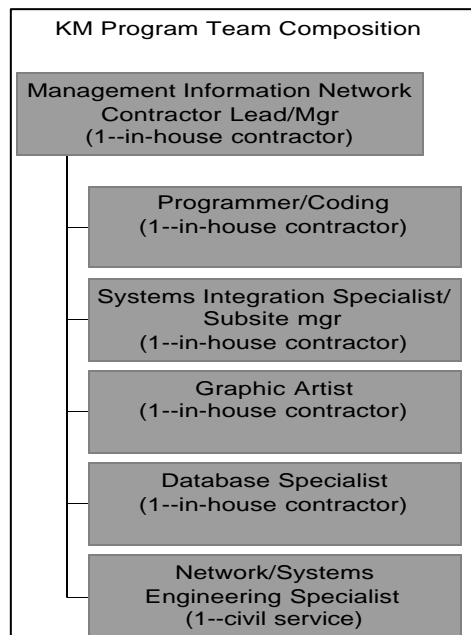
Figure 42. KM Program Team Composition

Findings on Influence Factors that Act as Barriers to KM in AFOTEC

Managerial Influence Factors

The purpose of the first research question was to identify managerial influence

factors that act as barriers to organization knowledge management. Using Holsapple and

Joshi's influences framework (2000) as a template for discussion, the following

managerial influence factors are discussed: leadership, coordination, control, and

measurement. The findings are discussed in the general order the questions were posed.

Leadership Factors

Lack of leadership commitment at higher levels. Within the Communications and

Information Division and AFOTEC organization, strong executive leadership

commitment "for" and involvement "with" the KM effort was evident. However, that

same level of commitment was non-existent at the higher-levels of the AF. At the time of

this case study, there was no active knowledge management effort, strategy and/or

supporting organization at the AF enterprise level. Also, current leadership philosophies

regarding the approach to integrating of AF-wide legacy/stovepipe systems still indicated

a very systems-centric versus knowledge-centric design paradigm. However, due to the

very closed and singular nature of the AFOTEC mission, the lack of leadership at the

higher levels appeared to have had minimum impact in its ability to pursue KM

initiatives. There had been some instances where it had been difficult to communicate

KM concepts and processes to the Air Staff-level Test and Evaluation staff counterparts,

but it very rarely halted progress. In fact, the SC Chief, Mr. Bill Becker, attempted to fill

some of the policy and information vacuum regarding KM, by organizing and hosting a

conference for all service test organizations. He believed there could be knowledge sharing amongst like organizations performing like missions across the services.

Difficult to "sell" KM. A significant leadership challenge relating to implementing organization KM recognized by the AFOTEC KM staff was the difficulty in selling the KM concept to customers. Even for a leader armed with facts, figures, and proof of how KM or a KM system might improve an organization's operations, it was extremely difficult to convince customers to change their ways of doing business. The leadership challenge was especially difficult if the leader was not extremely conversant in the same KM concepts he was trying to sell. Mr. Becker called this phenomenon the "not-invented-here syndrome." He also cited as an example his experience with the AFOTEC History and Research Directorate. After many months of cajoling and hand-holding, he finally convinced the Chief Historian that electronic archiving of test program information would ultimately make his job easier. Although the up-front work of scanning, categorizing, metadata tagging the information, and loading the database would be enormous, the final result would be an on-line, fully-searchable database that could be accessed by any authorized AFOTEC customer. The days of manual requests for historical information by test managers, and archivists digging through mounds of paper would be over. Despite the Chief Historian's reservations he proceeded with the project, and it ultimately became a phenomenal success. As a result, he became one of AFOTEC's most avid KM advocates. Had it not been for the difficult convincing efforts and determined leadership of Mr. Becker, however, the project may have never gotten off the ground.

Lack of realistic scheduling expectations. Again, the leadership support and commitment for KM within AFOTEC was outstanding, though it did come at a price. Over time, Mr. Becker and his staff found the leadership becoming more and more impatient in regards to bringing new applications on-line or completing modifications to new ones. In the words of Mr. Becker, "they want it all yesterday." The lack of realistic scheduling expectations required that priorities be constantly juggled and the backlog be continuously justified. Although Mr. Becker did an outstanding job of keeping such concerns removed from his staff, he spent considerable time negotiating with the leadership about *which* projects could be completed within *what* time frame with *which* limited resources.

Coordination Factors

Difficulty coordinating between "owners" of information. Because the AFOTEC KM program and system had matured over the years, customers were comfortable with KM concepts and capabilities and were always pushing the KM system team to design something newer, better, or with expanded capabilities. This was encouraging, but as the customer expectations expanded so did the need for the KM systems and processes that crossed organization boundaries. It was at this time (and continues to be) that the KM program team was faced with the difficult challenges associated with information ownership. Particularly, it became manpower intensive and politically trying to negotiate information sharing arrangements between organizations. Some organizations refused to give others access to their information, while others demanded that it was necessary for them to do their jobs properly. Coordination between organizations in this respect was

very difficult and sometimes required arbitration by more formal groups at higher levels of the organization.

Executive/steering committees needed to arbitrate. As the MIN grew, there became of myriad of associated issues that needed to be arbitrated by governing bodies outside SC. The KM program staff did not have the time or the authority to negotiate such inter-organizational topics. The highest-level issues were forwarded to the AFOTEC Executive Steering Committee for resolution. Others were deemed solvable by the MIN Working Group. At the time of this case study, the MIN Working Group had not been active for some time, but there were hopes from the KM program staff that it would be re-energized. The need for governing bodies to intervene and negotiate sensitive issues that cross organization boundaries presented a barrier to KM implementation in that it often delayed progress, but was seen as a necessary evil in the big picture.

Difficult to coordinate with base IT organization. Although many facets of implementing the KM program and system had apparently been easier because AFOTEC SC was an IT organization, it had not eliminated the requirement to coordinate and cooperate with the host base (which was Kirtland Air Force Base) IT organization, which belongs to, and comes under the policy direction of, Air Force Material Command. For many years and still to a great extent today, AFOTEC had been able to keep its technical architecture apart and separate from the host base architecture based on its Title 10 responsibilities and the sensitive nature of test-related information.   Under a new AFMC "one command, one network" philosophy, however, the pressure to turn over the

technical network infrastructure and management to the base level IT organization had been mounting. According to the staff, it continued to be a battle.

Difficulty coordinating with potential customers. Another challenging issue for the KM program team was to get potential customers to coordinate, collaborate, or at least consult with them on system development projects. In many cases, customers would want to develop databases or systems that would make use of MIN information sources or would possibly be accessed at some point via the MIN. Given that the essence of any KM effort is the sharing of knowledge/information across organization boundaries, it was clear that systems developed in a vacuum would have inherent problems and incompatibilities. Despite the KM team's efforts to increase communication between themselves and customers, these customers still often failed to coordinate requirements with the KM program staff. This situation would often lead to time lost for the customer and the KM team, when it was discovered that some critical component of the system did not work as expected and extensive re-work had to occur.

Control Factors

The AFOTEC KM staff identified a variety of control-related factors as being barriers to their KM effort.

Restrictive impact of external control policies. The existence of external control policies in regards to technical infrastructure issues and software standards were often seen as frustrating and often unnecessarily restrictive. Because the AFOTEC SC was an IT organization, it was particularly aware of the need for IT control policies and standards. So, for the most part, the KM program team made every effort to adhere to

higher level SC policies. The nature of the AFOTEC and the KM business, however, often necessitated nonstandard solutions. In particular, the technical infrastructure policies associated with the "one command, one network" philosophy continued to be controversial. Also, AF-directed software standards policies sometimes limited the KM team's field of choice. In the instance of establishing a standard for security software, the AF had standardized on a package called Sidewinder Firewall. Although this particular software was determined insufficient for AFOTEC's needs, the organization still bought the software and has it on hand just in case they were forced at some point to comply.

Need for internal control policies/enforcement. As the MIN expanded from the staff directory to other more complex applications, the KM team realized the need to establish a variety of internal control and enforcement policies. The lack of such policies and procedures hindered the MIN development and smooth operation. The main areas of concern mentioned by the respondents are addressed below.

Access privileges. Beginning with the staff directory, the development of an extensive program to establish controls and levels of information access was necessary. Without such a system the proper levels of security could not be ensured while still promoting the philosophy that users should own their information. The upfront work for the KM team was extensive. In the words of Mr. Robert Aguayo, the Chief Engineer and technical expert, "…not only did we have to figure out who had privileges, we had to figure out who grants…[those] privileges." Although the system of privileges still has to be maintained, the KM team now only manages permissions at the highest levels while appropriate individuals are delegated the same responsibility at lower levels.

Sub-site management. Another difficult challenge was the management of sub-sites. Although there were many issues to deal with such as personnel turnover and education/training, the KM staff found themselves particularly needing to control or rein in certain sub-site managers. Some sub-site managers had little or no training/capability, while others were very technology literate and "hot" to get their projects done. For this reason, the KM staff had to keep watch on the sub-sites and make sure no critical policies or procedures (such as security) were violated.

Content management. Although the KM program team's philosophy regarding delegated ownership of information was very explicit, the team still found itself faced with issues regarding content management. First of all, it was very hard to convince organizations and individuals that they were solely responsible for the accuracy and completeness of information on the MIN for which they were caretakers. For instance, every individual in AFOTEC has the ability to change and keep accurate his/her personal information contained in the staff directory. The same policy applies, only on a larger scale, to organizations that supply other types of information or access to databases. The KM staff worked hard to institute the culture change, which is now becoming more inculcated.

Another content management issue faced by the KM team was (and still is) information decay. As the MIN has grown, so have the stores of information and knowledge associated with it. As storage space is not unlimited and "old" information/knowledge is not useful, the KM team must help to develop policies and procedures that guide the disposal or the proper disposition/archiving of out-of-date

information. There are very few existing guidelines about how to go about developing

such policies or taking such actions so the KM program team has another difficult

challenge ahead.

The final content management challenge mentioned by the respondents concerned

the lack of policies (at many levels) and guidelines for storing and organizing

information. The lack of existing taxonomies and standard policies for metadata and

metadata tagging left AFOTEC to create its own internal processes and procedures.

Although these procedures had served their purpose well, the future application of new

search engines to existing data/information structures brought into question the original

approach. For instance, given that there was no AFOTEC enterprise approach to storing,

organizing, and tagging data, the new, reason-based search engine being deployed could

be less effective and powerful than it might have been otherwise.

Social control. There were very few elements of social control that appeared to

negatively impact the AFOTEC KM staff's ability to implement the knowledge

management program. In fact, Mr. Becker had been very resourceful in using the base

support contract to hire in-house contractors with the specific skills needed for the KM

team.

Measurement Factors

"Measuring" and or "valuing" the contribution of KM to the organization was not

presented by the interviewees as a relevant concern. Generic MIN website use statistics

were collected and tracked for information purposes, but had not been used specifically in

the past to defend the KM effort. It was acknowledged that the development of

appropriate and telling metrics was desirable, but the lack thereof had not been a barrier

in gaining/maintaining leadership or customer support so far. Leaders and customers

alike had been able to see the intrinsic value of KM through their everyday use of the

MIN.

The AFOTEC KM case study indicates there are a variety of managerial influence

factors that acts as barriers to organization KM. Table 13 summarizes these influences.

Table 13. Summary of Managerial Influence Findings for AFOTEC

Influence Factor	AFOTEC Findings
Leadership	• Lack of leadership commitment at higher levels • Difficult to "sell" KM
Coordination	• Difficult to coordinate between "info" owners • Executive/steering committees needed to arbitrate • Difficult to coordinate with base IT organization • Difficult to coordinate with potential customers

Control	• Restrictive impact of external control policies
	• Need for internal control policies/enforcement
	  • Permissions/authorizations
	  • Sub-site management
	  • Content management
	    • Ownership of info/knowledge
	    • Information decay
	    • Storing/organizing info/knowledge

Measurement	• Lack of appropriate measures

Resource Influence Factors

The purpose of the second research question was to identify resource influence factors that act as barriers to organizational knowledge management. In investigating the question, financial, human, material, and knowledge resources were addressed.

Financial Resources

Lack of adequate funding. The AFOTEC KM effort was relatively well-funded compared to other KM efforts observed by the researcher. The fact that the top AFOTEC general had determined that the MIN was a system critical to the command and control of the organization meant that it had access to an established and well-guarded funding stream. There were, however, consistent funding shortfalls for the ever-growing list of new infrastructure items, KM-related projects, and the manpower needed to accomplish the additional work. One of the respondents specifically cited a recent delay in deploying a new search engine due in part to the financial difficulties involved with purchasing a large number of licenses. Overall, Mr. Becker had to constantly balance requirements and juggle priorities in the face of constrained financial resources.

Human Resources

Lack of manpower availability. The lack of adequate manpower, driven by funding and hiring constraints, was a constant problem for the AFOTEC KM staff. As the MIN and its popularity had grown, and the complexity of the technical infrastructure had increased, there were more and more requests for new projects, and the maintenance of the existing components system expanded. One of the respondents stated, "…the extent of what we have to support is sometimes a little overbearing because it's not just

the MIN. It's the extranet, the Internet, and we have the classified side now, too." A majority of the respondents stated that they were victims of their own success. All the KM staff members were proud of what they had accomplished, but realized that their ability to complete the long list of awaiting projects would be significantly hampered without additional manpower. Respondents admitted that there had been attempts by higher management to throw manpower at projects, although it was not a viable solution to the problem. Mr. Becker stated that he had explained to management that it was like a woman having a baby—"it takes one woman nine months, not nine women at one month apiece."

Negative impact of turnover. The turnover of KM staff personnel and sub-site managers were recognized by the respondents as a significant barrier to implementing KM and KM systems. During the first couple of years of the KM team's existence, there had been major turnover in personnel. Reassembling the team and recovering the lost skills had been a major hurdle to overcome, in addition to the time lost in doing so. The turnover of mostly military sub-site managers also had been and continued to be a major problem. One of the respondents, referring to the sub-site managers, stated, "They ramp up on it, get real good…you get real comfortable, and then they're gone. Somebody new comes in and it's a retraining issue that every couple of years [we] seem to be going through."

Lack of knowledge, expertise and skill. Somewhat related to the issue of turnover was the lack of proper knowledge, expertise, and skill. For the KM program staff, the loss and hiring of knowledgeable team members had been a challenge. Mr. Becker stated that

early on in the creation of the KM team that he had desired to get military programmers

to do the necessary software development, but he could never get knowledgeable "fills"

for his positions. As a result, he turned to hiring contractors. In doing so, he had to be

very creative in writing the position descriptions to ensure the right people with the right

knowledge and skills would be selected for the positions. Technical skills were stated as

being the primary consideration where the KM knowledge and expertise would be

developed on the job over time.

The lack of knowledge, expertise, and skill of the sub-site administrators was also

a significant issue. As many of the sub-site managers were volunteers and or simply

appointed to take over the duties, a consistent knowledge base across all the sub-sites was

non-existent. To add to the difficulties, the AF offers no official training for such

positions or responsibilities and has not recognized the sub-site manager (or webmaster)

as an official position. The negative impact of this situation on the KM effort was that

KM staff often committed a lot of time to training and/or coaching those individuals and

bringing them up to speed both technically and philosophically.

Training for users very necessary. Because the use of the MIN was widespread

and became an integral part of doing everyday business in AFOTEC, the need for user

training became a serious issue. As the MIN grew, it was discovered that many

individuals did not know how to use it to find the information/knowledge that they

needed. It had simply become too big and complicated for users to be told it was self-

explanatory. Although providing training on the MIN was certainly beneficial for users

and for beginning the KM culture change, it was nevertheless necessary to address the lack of KM related knowledge, skill, and expertise of customers at large.

Material Resources

Technical infrastructure challenges. Although the levels of funding for the KM effort had been at reasonable levels, resource constraints were still a reality in building and expanding the technical infrastructure that supported the MIN and made it accessible by all AFOTEC customers. Due to the dispersed geographic nature of AFOTEC units, connectivity and bandwidth were central concerns. Customer expectations had grown to such an extent that they expected connectivity to the MIN anytime, anyplace. Regardless of whether the customer was located at one of the AFOTEC detachments or performing an equipment test in the middle of the desert, they expected the same level of service. The lack of funds sometimes delayed procurement of necessary infrastructure items and/or forced the KM staff technical experts to come up with creative, but workable solutions.

Besides financial limitations, the KM program team constantly faced the challenge of being on the leading edge of technology solutions. Due to its geographic dispersion and the need for tight network security, AFOTEC infrastructure requirements were often unique. This challenged the team to come up with unique solutions not always proven and tested in private industry. Mr. Robert Aguayo, the team's network engineering expert, cited a recent instance where he had approached a vendor at a conference about a voice-over-IP (VOIP) issue. The vendor appeared to offer a service that AFOTEC might be able to use; however, its solution did not solve all AFOTEC's

problems. Mr. Aguayo suggested an alternative technical solution that did not fit the

vendor's existing business model, though the vendor was intrigued by the idea and had

stated that it was something they had not even considered.

Knowledge Resources

Human knowledge resources. As described by Holsapple and Joshi, human

knowledge resources are the "raw materials" for knowledge activities (2000, p. 241).

The human knowledge resources throughout AFOTEC were extensive. It was also

acknowledged that KM needed to be used to help stem the impending drain of these

knowledge resources due to the retirement of many civil service employees and others.

Despite recognition of the importance of tacit knowledge, very little was currently being

captured. Tacit knowledge contribution to the MIN and or other repositories was

certainly encouraged, but had not happened to a large extent. It had been the AFOTEC

KM staff's personal experience that it was almost impossible to get individuals "to put

things in" the system if it was not done as a natural part of their daily work processes.

Given the maturity of the KM effort and the depth of some of the applications, however,

much of the available information on the MIN could be considered knowledge given the

right context. For instance, the Quad Chart, created by the KM staff to pull information

about test programs from various sources into a simplistic four-box presentation, offers a

multi-dimensional snapshot or knowledge of programs as opposed to just stand alone

snippets of information.

Incompatible/Inaccessible knowledge/information stores. For those electronic

stores of information and knowledge that did exist within the AFOTEC, much of it was

still trapped in legacy systems or applications. The challenge for the KM staff had been to make those knowledge stores accessible through use of creative programming techniques and software products such as ColdFusion[11]. Consolidating information from multiple sources had also been a problem due to the inconsistency of data elements from application to application.

Lack of KM-supportive organizational culture. To reiterate, the knowledge of organization culture is a human knowledge resource that significantly impacts the implementation of KM. The lack of a widespread KM-supportive culture presented the KM staff and KM effort with significant challenges. Evidence of the lack of a KM-supportive culture could be seen in the many instances of resistance to change. Individual and organizational resistance to change was one of the toughest negative influences the KM team had to deal with. From individuals just not wanting to change their daily routines to whole organizations that still hung onto the idea that "knowledge is power," the KM team constantly fought an uphill battle in bringing KM-related improvements to AFOTEC. As the team has delivered more and more success stories, their battles have become fewer, although a complete culture change is still in the offing. One respondent suggested that the large and dispersed nature of AFOTEC organizations was a barrier to good, clear communication about KM. In addition, the diffusion of any new innovation to all levels takes time. Overall, the positive reinforcement of KM concepts and the use of the MIN as a command and control mechanism by the AFOTEC

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[11] ColdFusion by Macromedia is a software product that allows the creation of dynamic web pages that can be populated by existing databases.

leadership has allowed for great progress in the journey to culture change, but the KM

team realizes they still have many challenges ahead.

Table 14. Summary of Resource Influence Findings for AFOTEC

Influence Factor	AFOTEC Findings
Financial	• Lack of adequate funding
Human	• Lack of manpower availability • Negative impact of personnel turnover • Lack of KM knowledge, expertise, and skill • Training for users necessary
Material	• Technical infrastructure challenges
Knowledge	• Lack of tacit knowledge capture • Incompatible knowledge/information stores • Lack of knowledge about KM-supportive culture

Environmental Influence Factors

The purpose of the environmental influence factor category according to

Holsapple and Joshi (2000), is to capture and separate those influences that are external

to the organization being examined. For the purposes of this research, the definition of

"external" was defined as outside the confines of the immediate KM program

organization. In the case of a large military organization such as the Air Force,

influences at the major command levels and higher can be considered external to

organizations such as AFOTEC. The influences discussed below were considered

external to the AFOTEC SC (which includes the KM program team), but all such

influences weren't necessarily external to the Air Force as a whole.

GEPSE Climate

The GEPSE (governmental, economic, political, social, and educational) climate

ultimately impacts all aspects of the military organization. The influences of this climate

are passed on to the military through political channels as well as through military

leadership and the individuals who serve. Recognition of these influences, however, at

the lower levels of the organization hierarchy is almost non-existent. In the case of the

AFOTEC KM staff respondents, the influences of the GEPSE climate were regarded as

much more indirect than direct.

Negative impact of politics. The influence of national politics on the military, or

AFOTEC, was rarely mentioned, though the resultant reductions to the military budget

were accepted as having an indirect impact. The influence of politics, both inside and

outside the military, as a result of the September 11th bombings was mentioned much

more frequently. As described by the respondents, one way the political climate had

impacted the KM effort was that the military leadership of AFOTEC had demanded

immediate changes to the MIN.   As one respondent described it, "….right after [9/11] we

completely re-did the MIN and the format…the look of it, the layout, and everything that

was posted. …we added the threatcon and infocon…and had the force protection news

updated all the time." The change in the political/governmental climate post 9/11 also

disrupted KM staff operations, as all contractor personnel were thrown off base and not

allowed to return until the proper security checks were completed.

Negative social impact. The AFOTEC KM staff repeatedly experienced the

demands of an increasingly technological social culture. Customers continued to be more

aware of what technology could offer and, as a result became increasingly more

expectant about what capabilities they expected the MIN and the KM staff to deliver.

This social influence pushed the team to develop new applications and tackle new ideas.

It was, however, often a drawback in that customers never seemed to be completely satisfied and the list of impending projects only grew longer.

Technology

Negative impact of rapidly changing technology. For the most part, technological advances had benefited the AFOTEC KM effort by allowing for a more robust, reliable and secure system and network infrastructure. However, many aspects of technology that the KM staff was concerned with continued to change at such a pace that it was hard to keep up, especially in light of funding constraints.

Time

Lack of time. All the respondents stated in one manner or another the lack of time negatively impacted their KM efforts. The lack of time has acted as a barrier to KM in that in today's fast-paced environment that there seems to be less and less time to tackle new initiatives, develop new systems, capture individuals' attention about new concepts, and to experiment with new ways of doing business. To add to that frustration, today's customer expectations regarding turnaround times continue to increase.

The AFOTEC case study indicates there are a variety of environmental influence factors that acts as barriers to organization KM. Table 15 summarizes these influences.

Table 15. Summary of Environmental Influence Findings for AFOTEC

Influence Factor	AFOTEC Findings
GEPSE Climate	• Negative impact of politics • Increased security climate • Social expectations
Technology	• Negative impact of rapidly changing technology
Competition/Fashion	• N/A
Time	• Lack of time

Summary of Influence Factors for AFOTEC

In summary, this chapter has presented the findings from the case study of the Air Force Operational Test and Evaluation Center KM effort. Using Holsapple and Joshi's (2000) framework as a guide, the three classes of influence factors—managerial, resource, and environmental—have been examined. The findings suggest that a variety of influence factors act as barriers to implementing and executing organization knowledge management. Some findings are particularly unique to the military. These findings are compared to five additional case studies.

CHAPTER SEVEN--MARINE CORPS SYSTEMS COMMAND[12]

Organization and KM Program Profile

Organization Structure and Mission

The Department of the Navy consists of two uniformed services: the United States Navy and the United States Marine Corps. As such, the Commandant of the Marine Corps reports directly to the Secretary of the Navy (see Figure 43).
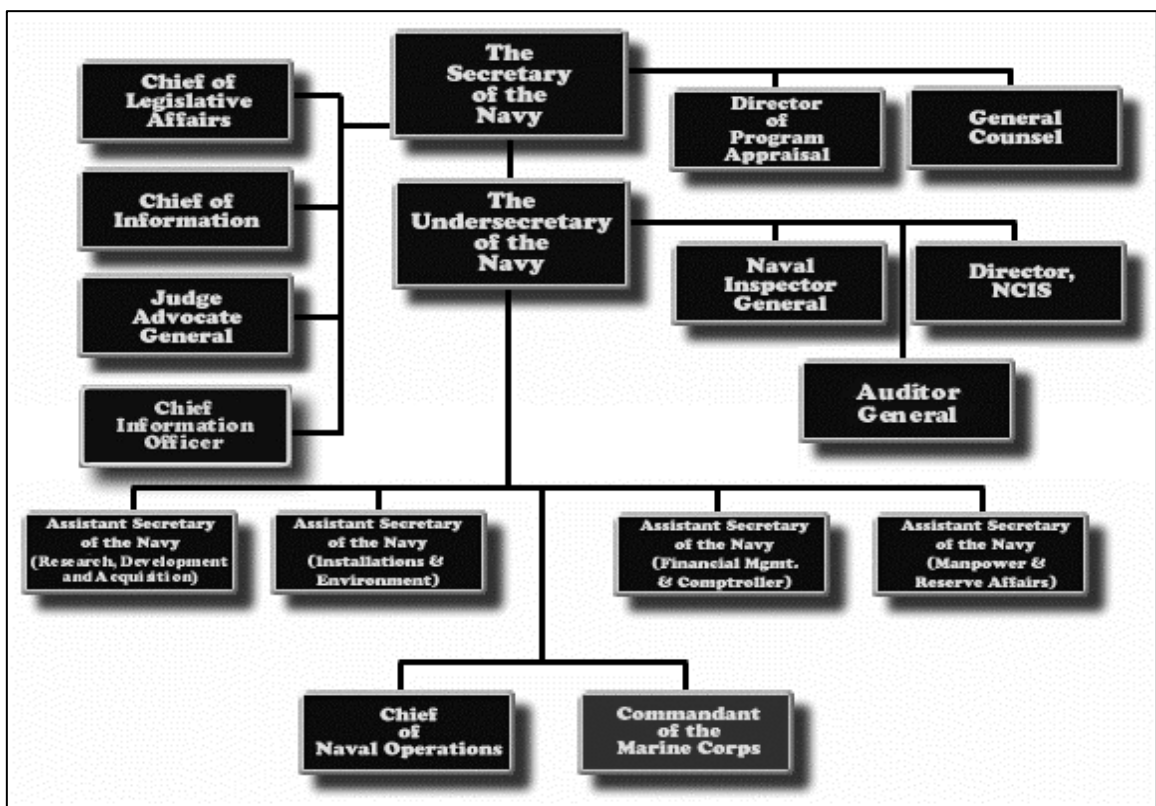
Figure 43. Reporting Chain of U.S. Marine Corps

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[12] Information for this case, except where stated otherwise, is based on interviews conducted March 26, 2002, at MARCORSYSCOM.

The Marine Corps Systems Command (MARCORSYSCOM) is a Headquarters

United States Marine Corps (HQ USMC) agency that reports directly to the

Commandant of the Marine Corps through the newly formed Marine Corps Material

Command (Figure 44).
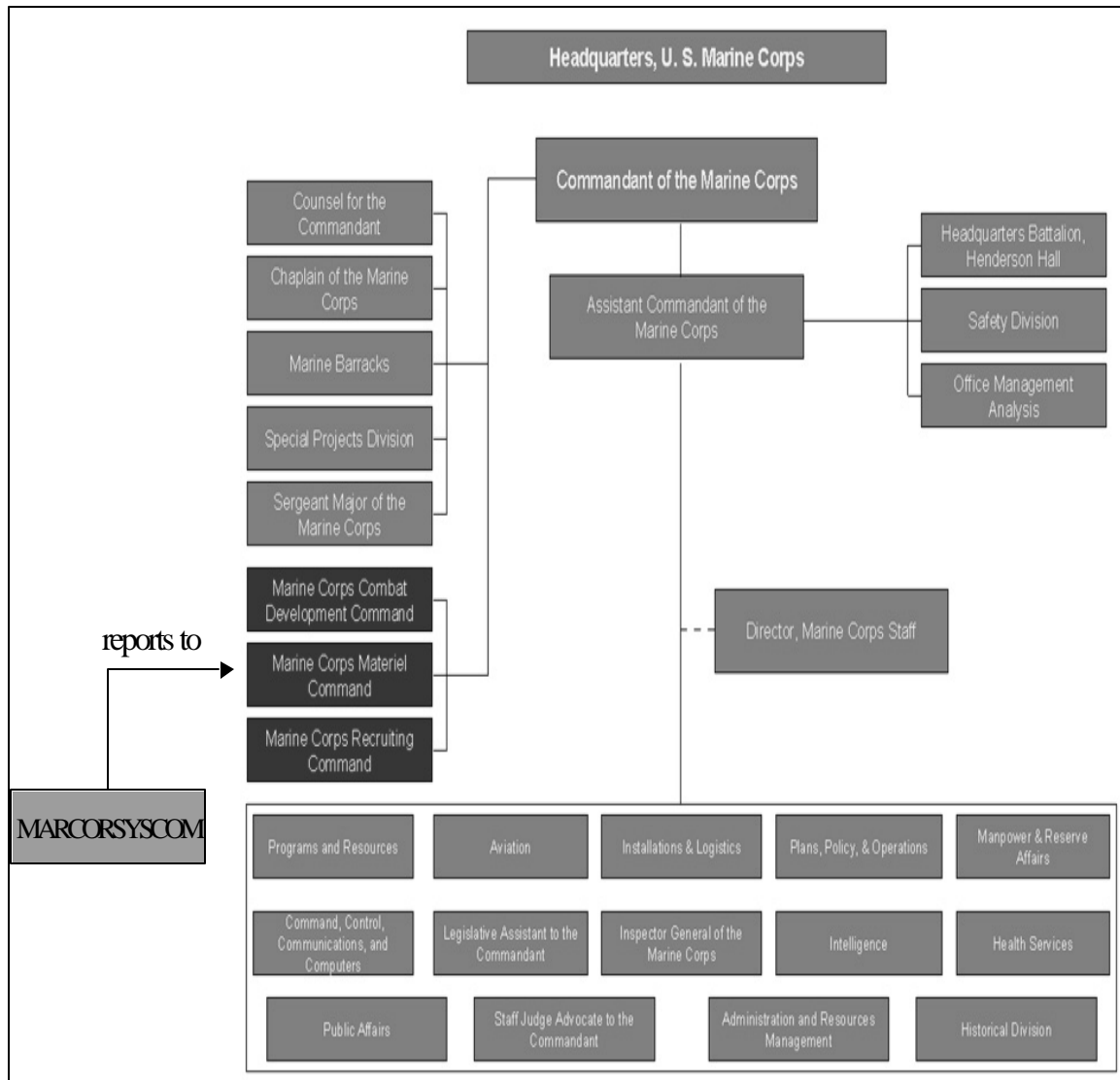
Figure 44. MARCORSYSCOM's Relationship to Marine Corps Material Command

MARCORSYSCOM also reports to the Assistant Secretary of the Navy for Research,

Development, and Acquisition for issues concerning acquisition (see Figure 45).
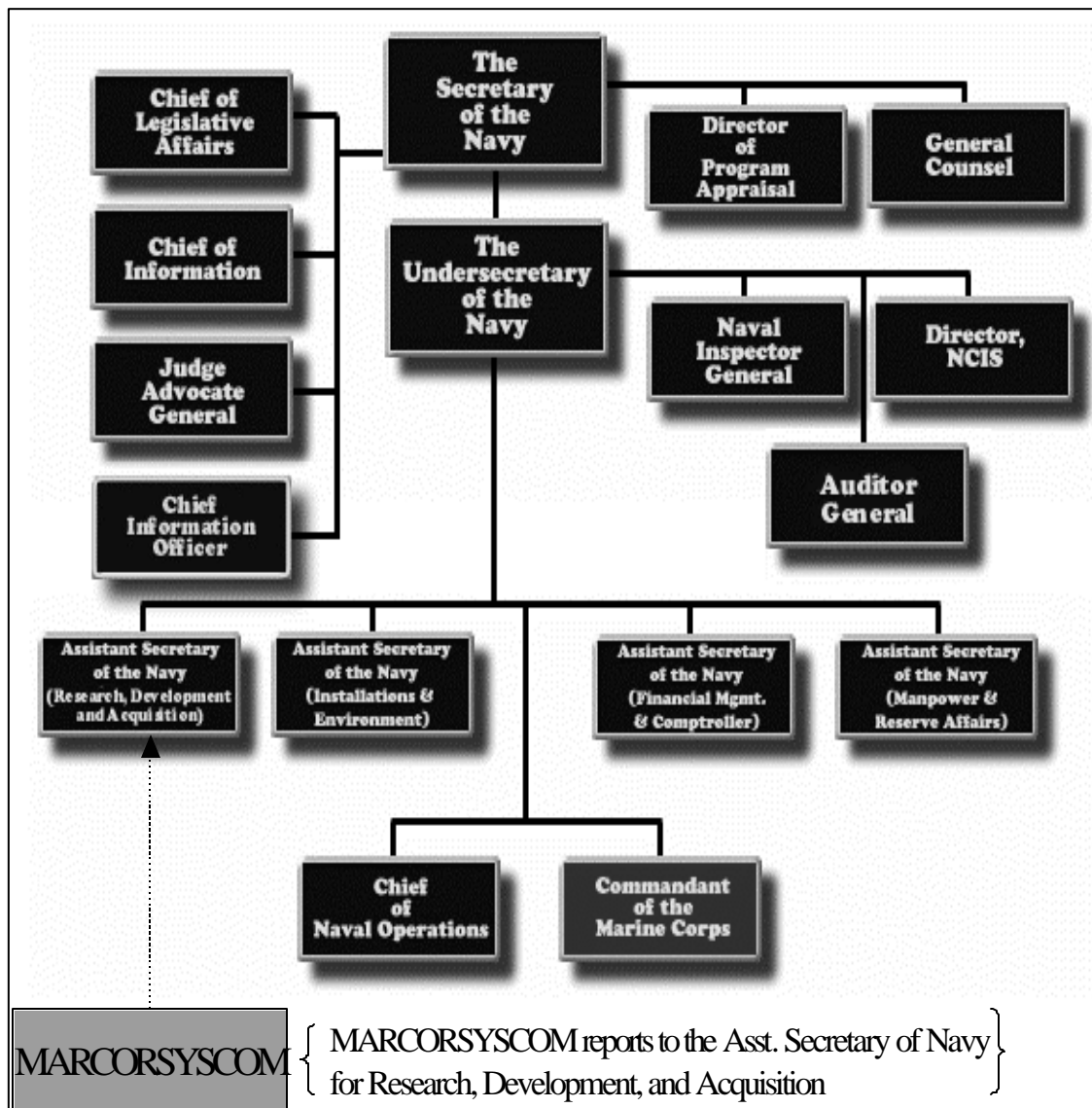
Figure 45. MARCORSYSCOM's Relationship to the Asst. Secretary of the Navy,
Research, Development, and Acquisition

The mission of MARCORSYSCOM is "to serve as the Commandant's principle

agent for equipping the operation forces to accomplish their warfighting mission"

(www.marcorsyscom.usmc.mil, retrieved May 25, 2002). In doing so, its objective is to field

and support equipment and systems to Marines by providing professional acquisition

support in a timely, efficient manner. Since the Marine Corps Material Command

(MATCOM), which overtook some of MARCORSYSCOM's traditional roles, reached

operational capability in January 2001, the focus of MARCORSYSCOM has been re-

scoped to life- cycle management of equipment and systems only. The Marine Corps

logistics bases, which are now also under the direction of MATCOM, are now the

designated providers of supply chain management, maintenance management, and

strategic prepositioning capabilities. MARCORSYSCOM is the home to approximately

1500+ civilian and military employees who serve at six Marine Corps bases located

across the U.S. Headquarters MARCORSYSCOM is located 35 miles south of

Washington, D.C. on Quantico Marine Corps Base.

MARCORSYSCOM KM Program "Home"

MARCORSYSCOM consists of many organizations that operate together to

accomplish its mission. The organization structure is depicted in Figure 46. One of the

many organizations within the command headquarters is the Operations Division which

is under the direction of the Assistant Commander of MARCORSYSCOM. As currently

configured, the Chief Information Office, which is also the "home" of the

MARCORSYCOM knowledge management effort, falls under the Operations Division.
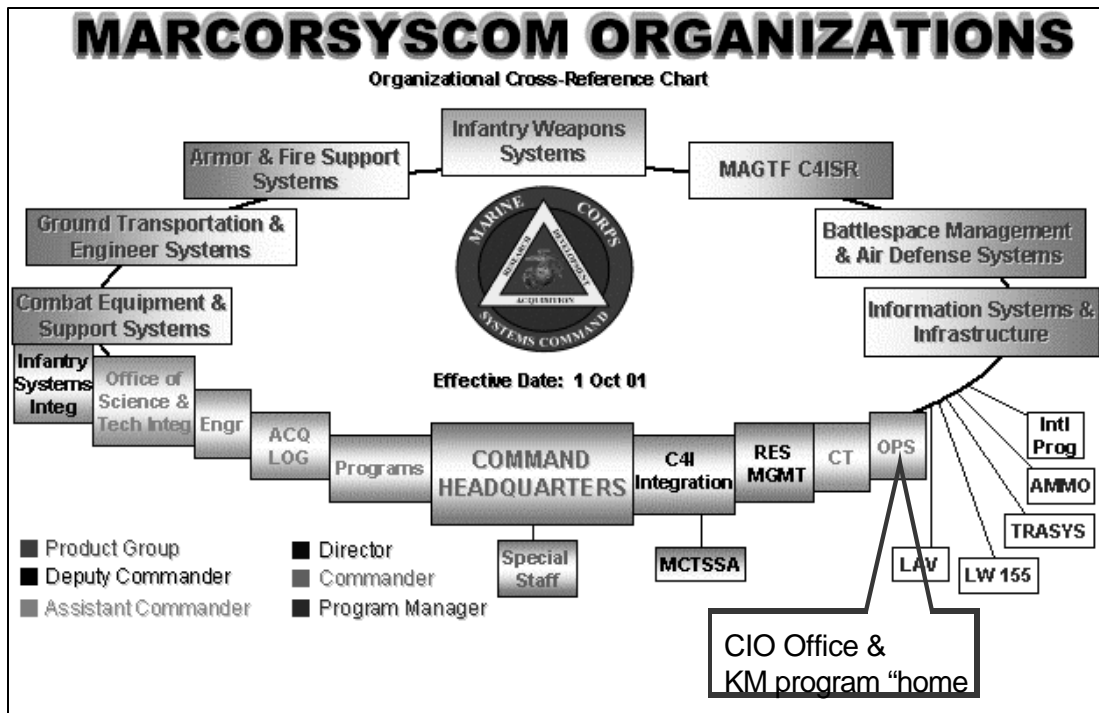
Figure 46. MARCORSYSCOM Organization Structure

History

The MARCORSYSCOM KM effort is relatively new. It officially began in

February 2000 with the completion of the KM Design Team formal charter. The

motivation for the MARCORSYSCOM KM effort stemmed from the realization that the

command lacked "the process and technical tools to properly harness the collective,

intellectual capital of the members of the command" (MARCORSYSCOM Charter for

KM Design Team, 2000). The charter stated specifically,

> This results in the command wasting resources by reinventing knowledge,
>
> spending excess time locating difficult to find knowledge and
>
> unsuccessfully absorbing and using the growing volumes of new
>
> knowledge flowing into the command every day. Best practices dictate

effective implementation of a robust enterprise-level knowledge

management system that captures tacit knowledge and makes it available

to all members of the command. This system should also leverage

information technology by supporting the automation of core business

processes. Command-sponsored efforts to date only provide a static

snapshot of acquisition information, and fail to serve as a problem-solving

tool and source for continuous learning. (Charter for the

MARCORSYSCOM KM Design Team, 2000)

Given that background, the MARCORSYSCOM leadership further stated:

The numerous and disjointed information systems in use throughout the

command create a roadblock to accessing, analyzing, and presenting

knowledge. These systems are neither integrated nor accessible across the

enterprise. MARCORSYSCOM has invested exorbitant effort and

resources to ensure that its users remain proficient with these information

systems. However, even if highly proficient with a multitude of

information systems and business intelligence tools, users are not

guaranteed timely insight into the very best information to support

business decisions. (Charter for the MARCORSYSCOM KM Design

Team, 2000)

MARCORSYSCOM KM Vision

Despite the heavy technical emphasis on building a KM system evident through

the KM Design Team charter, the Chief Information Officer, Lt Col Dale Houck, (who

also served as the KM team lead) was quick to point out that "knowledge management is

not a 'system' but rather a process. The term 'system' tends to imply that it's an IT

solution when it's not" (Feigley & Houck, 2001). Brigadier General Feigley,

Commander of MARCORSYSCOM, was quoted as saying, "I am equally committed to

the idea that information technology must always be used as a tool in support of the

Command's core business and not as an end in itself. No technology for technology's

sake. We are trying to develop a knowledge-centric culture which uses technology as a

mere aid to the creative individualism of people" (Houck & Delarm, 2002). Lt Col

Houck described the MARCORSYSCOM vision for the future of the KM effort:

> "The command will start small and expand practices and technology as the
>
> practice proves itself. The first tool will be text mining/mapping software.
>
> The basic premise is to enable computers to extract meaning from text and
>
> to use that to better categorize and deliver useful information. Additional
>
> software will enable collaboration and sharing of knowledge. The
>
> objective is to provide our employees what they want—a system that
>
> provides relevant, useful information with as little effort as possible."
>
> (Feigley & Houck, 2001)

As for the longer term, MARCORSYSCOM's stated goal is to implement knowledge

sharing across the Department of Defense acquisition community by initiating cultural

change.

MARCORSYSCOM KM System

The MARCORSYSCOM KM system, referred to as TIGER (Total Information Gateway for Enterprise Resources), was established in 2000. It was developed by the KM Design Team and KM technical team to satisfy the MARCORSYSCOM leadership's criteria of:

> "a properly designed knowledge management system that will solve the problem of "infoglut" created by information overload. Furthermore, in order to achieve the end-state of becoming a knowledge-based organization and the objectives of paperless acquisition, [the] system [should] maximize the potential of the Web and intranet-based communications" (Charter for the MARCORSYSCOM KM Design Team, 2000).

The composition of TIGER was conceptualized as an integrated family of web-based applications. These applications were categorized logically into three layers described as business intelligence, business tools, and supporting tools as seen in Figure 47. TIGER's current technical infrastructure makes use of redundant servers with worldwide connectivity provided via the Internet and extranet connections. The development tools used to build and implement TIGER include Lotus Domino R5, MS SQL, Exchange 2000, ASP, IIS, Java Script, XML, and Oracle. The commercial-off-the-shelf applications in use are Lotus Quickplace®, Same Time®, Domino.doc®, Extended Search, and Meridian KSI Corporation's Learning Center. The principle customer base includes 1500+ MARCORSYSCOM customers, 200+ Material Command customers,

200+ customers from various Marine Corps commands, and an additional 200 customers from outside the Marine Corps.
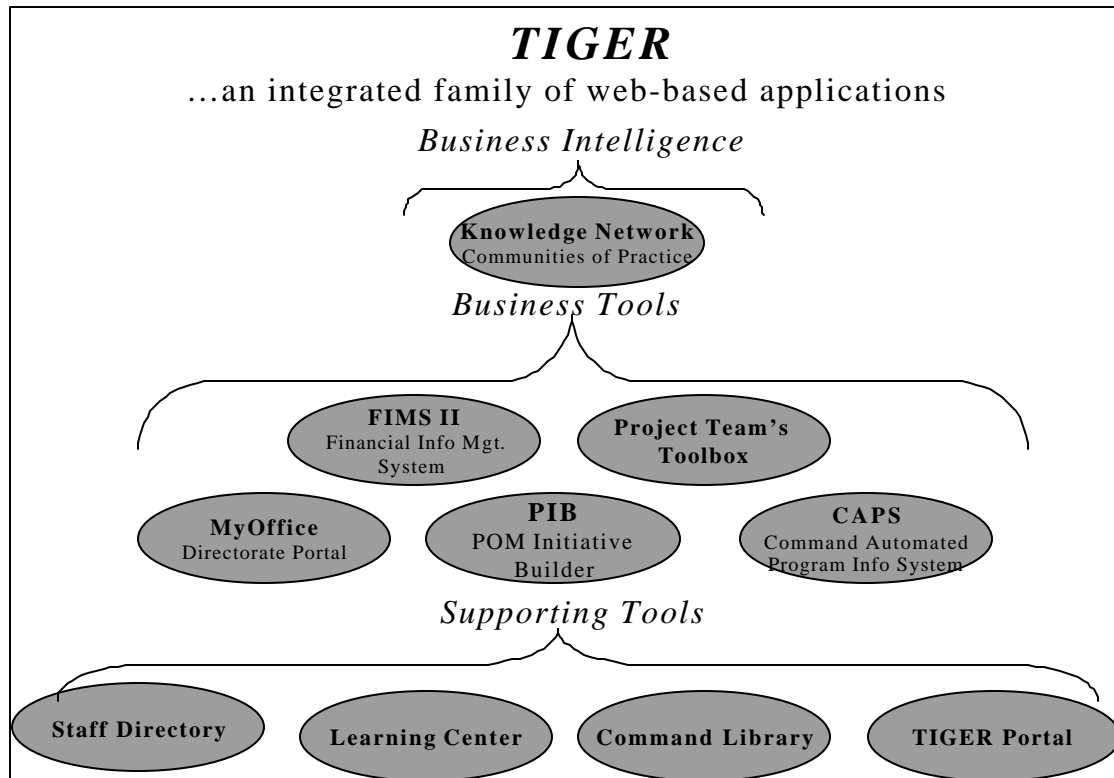
Figure 47. Conceptual Organization of TIGER Applications

The KM Staff openly admitted that a majority of the TIGER still focuses on information as opposed to knowledge, although they have confidence it will evolve more toward knowledge in the future. As described on the MARCORSYSCOM website, (www.marcorsyscom.usmc.mil, retrieved May 25, 2002), TIGER is MARCORSYSCOM's informational gateway that interfaces all command information systems. It is used by all echelons of the Command, including the program manager and subordinates and the Command support elements in execution of the acquisition process and internal resource management functions. Overall, the creation of TIGER aligns with

the commander's objectives for the Acquisition Center for Excellence and provides the

communication benefits needed in today's successful enterprises.

MARCORSYSCOM KM System (TIGER) Components

The MARCORSYSCOM KM system (or TIGER) is a secure system that uses a

central website as its portal. Only authorized users can access the system through the

local intranet or extranet connections. Specifically, the TIGER homepage (Figure 48)

acts as a central hub for access to a variety of sub-systems that include: the Command

Automated Program/Information System (CAPS), Knowledge Centers, MyOffice, and

the staff directory. The overall conceptual organization of the system is shown in Figure

49.

Figure 48. TIGER Homepage
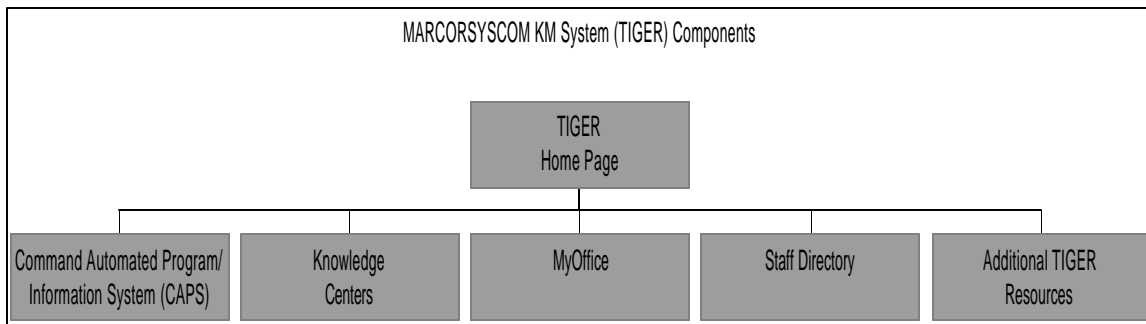
Figure 49. MARCORSYSCOM KM System (TIGER) Components

Each of the components serves a different purpose in the spectrum of the TIGER

system. The following is a brief description of each component as currently described on

the MARCORSYSCOM public website.

Command Automated Program/Information System (CAPS)

CAPS stores and makes available frequently referenced programmatic data,

documentation, and digital files pertinent to the programs managed by

MARCORSYSCOM. CAPS also performs the mandatory archival of acquisition program

documentation and serves as the report generation basis for mandatory acquisition

reporting.

Knowledge Centers

Specific knowledge centers are accessible through the Knowledge Center home

page (Figure 50). These "virtual" centers provide a common area for the collection and

dissemination of information regarding specific topic areas. They include best practices,

lessons learned, competencies, discussion groups, and access to subject matter expertise.

Overall, these centers provide knowledge management capabilities that open

informational flows across command functional and organizational lines.

Figure 50. Knowledge Center Home Page

MyOffice

MyOffice is a user-customizable tool that provides workflow automation and tracking in support of the administrative and tasking processes of the command.

Staff Directory

The staff directory (Figure 51) acts as the central human resource database that supports command personnel through all stages of assignment and training. It also enables workflow and member interface in the TIGER environment. Finally, the staff directory establishes the "existence" of command members and provides five levels of access which delineate who has access to what (i.e. read, edit, manager, author).
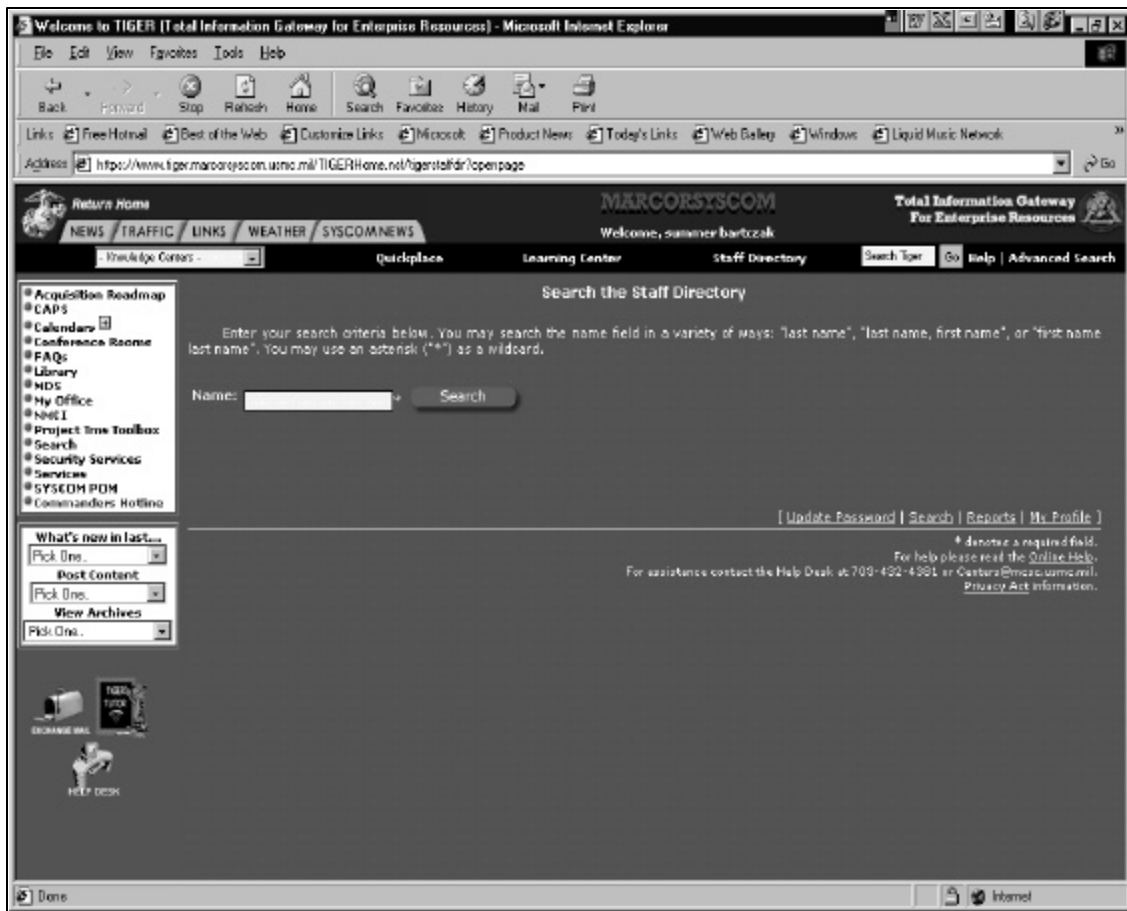
Figure 51. Staff Directory Home Page

Additional TIGER Resource.

TIGER also offers additional links to important resources such as world/local news, traffic reports, weather information, MARCORSYSCOM news/frequently asked questions (FAQs), knowledge centers, Quickplace collaboration forums and more (Figure 52). The Quickplaces are electronic workspaces for groups and/or integrated product teams (IPTs) who have both a need to team in a virtual workplace and the need to capture knowledge associated with the teaming. TIGER also offers links to the MARCORSYSCOM Learning Center (Figure 53).
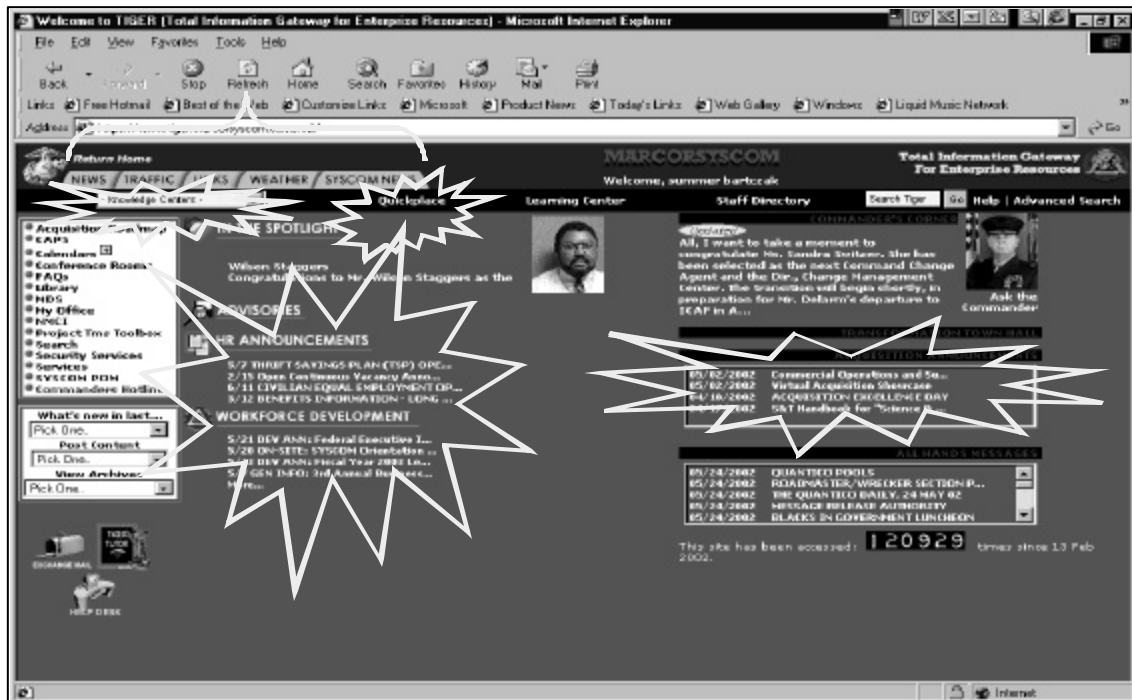
Figure 52. Additional TIGER Resources

Figure 53. Learning Center Home Page

MARCORSYCOM KM Team

The MARCORSYSCOM KM Design Team, was born out of the leadership's desire to implement an enterprise knowledge management system. To this end, a formal charter was developed which addressed the specific tasks for the team and outlined its composition and governing body. The general task assigned to the team was that it "provide oversight regarding the development and implementation of a knowledge management system that supports the core competencies of the command" (Charter for MARCORSYSCOM KM Design Team, 2000). The Chief Information Officer was designated as the leader of the KM Design Team. As such, he was/is accountable to the Marine Corps Systems Command Steering Committee for project direction to include technical and operational implementation and integration. As stated in the charter, "…the effectiveness and suitability of a knowledge management system is dependent upon a clear statement of the business problem and identification of our knowledge requirements. For that reason, the KM Design team includes members with differing backgrounds and distinct skill sets" (Charter for MARCORSYSCOM KM Design Team, 2000). The Design Team was subsequently composed of representatives from all key MARCORSYSCOM organizations.

With the KM Design Team providing oversight, the CIO's office was tasked with technical and software development tasks necessary to develop integrated TIGER portal applications. Of the three sections of the CIO's office, the Applications and Development section was put in charge of the task. Although the number of personnel committed to TIGER development projects has changed over time, the composition of

the CIO application development staff at the time of the case study can be seen in Figure

54. The technical staff split their time between development for command-type

applications, CAPS, and TIGER. At the time of the case study, only two members of the

staff were committed to doing development projects, and one of those had to split his

time between CAPS and TIGER projects.
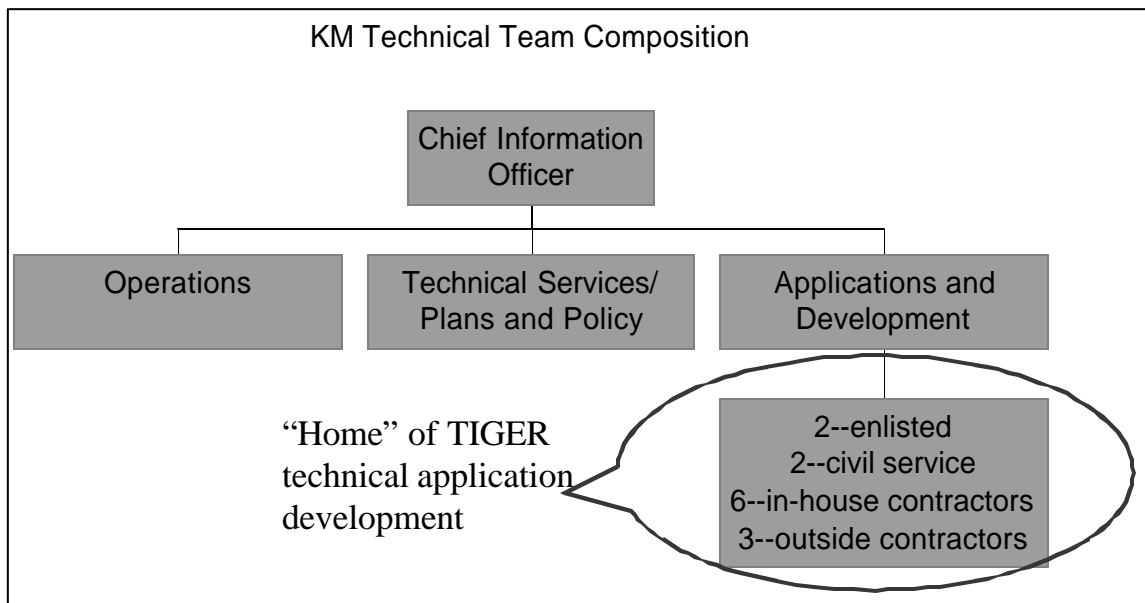
Figure 54. KM Technical Team Composition

Findings on Influence Factors that Act as Barriers to KM in AFOTEC

Managerial Influence Factors

The purpose of the first research question is to identify managerial influence

factors that act as barriers to organization knowledge management. Using Holsapple and

Joshi's influences framework (2000) as a template for discussion, the following

managerial influence factors are discussed: leadership, coordination, control, and

measurement. The findings are discussed in the general order the questions were posed.

Leadership Factors

Lack of initial leadership commitment. Although senior leadership commitment was recognized as strong after a year of the MARCORSYSCOM KM effort, respondents stated that it had not always been that way. They stated that it had been hard initially to convince senior leadership of the value and utility of KM. Much of the credit for convincing senior leadership to move forward with KM was given to Lt Col Dale Houck, MARCORSYSCOM CIO and KM Design Team Lead. Despite the strong KM leadership evident in the Navy, the Marine Corps' leadership was not equally "tuned in" to KM. Much of the focus in the Marine Corps and MARCORSYSCOM appeared to be on the transformation effort, not any KM initiatives. Lt Col Houck's partnership with the official command Change Agent, Randy Delarm, however, helped to integrate the KM vision and actions with the overall command transformation strategic plan and effort. Respondent's recognized Lt Col Houck's role in spearheading the KM effort as critical. Without his dedication, vision, and unique ability to rally a cohesive, forward-looking team, the MARCORSYSCOM effort may have never materialized

Lack of confidence about continuing leadership support. Fear about the potential lack of continuing leadership support at both the MARCORSYSCOM and CIO levels was evident. Many respondents mentioned the fact that a new MARCORSYSCOM commander was inbound (Summer, 2002), and they were not sure of his position on KM. One respondent stated that many KM actions had been rushed in order to get them completed before the new General arrived. Another respondent stated that he and another staff member were scheduled to both meet the new General and to visit his present

organization so that they could get a better feel for his perspective on KM. As for the CIO

position, it was also common knowledge that Lt Col Houck was moving on to another

job. Respondents indicated that the impending change of leadership at these critical

levels had already slowed progress; personnel were reluctant to pursue new efforts given

the possibility that the new leadership would not be equally as supportive. All agreed

that the KM effort had come a long way, but currently they were not sure what direction

to take next.

Lack of reinforcing behaviors. Despite the vocal support for KM from executive

leadership, some respondents indicated that continuous reinforcement of KM concepts

and behaviors by those leaders was lackluster. Remarking about the lack of feedback for

putting information/knowledge into any of the KM system (TIGER) components, Mr.

Jim Riordan, Director of Combat Equipment and Support Systems stated,

> "…I think any of us need to be constantly reinforced that we're doing a
>
> good job or we're doing something that's of value to people. And it does
>
> not have to be monetary…it could just be "hey, nice job or liked what you
>
> did". That doesn't happen. [There's] very little recognition from the top
>
> of the organization."

 Mr. Riordan continued,

> "…the General is a big supporter of it [KM]. His deputy commander is a
>
> big supporter of it. But neither of them are overtly positive or reinforcing
>
> of [it]. If every week the General had his roundtable discussion with all
>
> the senior leaders…and was to say something positive…that would help."

Another respondent mentioned that the lack of change in the "In the Spotlight" feature, a TIGER home page individual recognition piece, also indicated that the leadership was not reinforcing KM behaviors and/or use of the TIGER system.

To MARCORSYSCOM's credit, they had taken extensive efforts to establish formal mechanisms for rewarding and reinforcing KM–related behaviors. Specifically, the civilian personnel appraisal system had been adjusted to accommodate and incorporate rating categories that addressed many facets of KM participation. Besides the appraisal system, which rewarded behaviors like teamwork, and information/knowledge sharing, on-the-spot and special monetary and time-off awards were also given for KM outstanding performers. Despite these mechanisms, the reward systems were still viewed by most as having significant limitations. One limitation involved the fact that award money was very limited—it usually did not amount to much after taxes and sometimes the "money pot" ran dry. Another was the fact that there was not an equivalent program for the military. Finally, even if the reward systems had been flawless, supervisors simply did not have the time to recognize individuals like they should or wanted to. Overall, the lack of a cohesive approach and program for rewarding and reinforcing KM-related behaviors contributed to significantly slower evolution to a KM-supportive culture.

Difficult to "sell" KM concept. Selling the KM concept to senior leadership (and others) had been a difficult task. In order to get leadership support, it had been necessary for the KM Design Team to pick an easier project that could serve as a proof of concept. The initial project selected was the creation of a staff directory. Although development

of the staff directory was a major accomplishment and success, it was only the first of many necessary KM projects that needed to be tackled. The lack of hard facts and figures that could prove potential manpower or cost savings as a result of KM made convincing and maintaining leadership support in the way of continued financial and manpower support for additional projects a continuing challenge.

Difficult to" lead" KM effort. Although Lt Col Houck, the CIO, and the KM Design Team were fervent about KM and the benefits of KM, they still lacked knowledge about exactly how to best lead the KM effort. In order to discover what approach/tools might work best, they benchmarked with other organizations with KM programs, such as MITRE and NAVSEA, as much as money allowed. During the early days of the KM effort, Lt Col Houck had even tried to bring in some very well-regarded consultants to assess the MARCORSYSCOM situation and to give some recommendations for approaching KM implementation, but the lack of funds made it impossible. All in all, the KM Design Team developed their own approach based on the culmination of all they had seen in the field, their personal experience, and what they had read in the literature. Mr Riordan, Design Team member, recalled, "So we start[ed] looking around and [saw] some great possibilities…and then [laid] down what we would do with it if we could." The central frustration for some respondents was not knowing if they were on the correct path.

Coordination Factors

Difficulty of "negotiating" Navy/Marine Corps Internet (NMCI) initiative. The purpose of the Navy/Marine Corps Internet initiative is to create a single unified network

across 400,000 shore-based "seats." This approach, led by the Navy, views the computer

network infrastructure as a utility that will be purchased on a "per seat basis" through

contract to EDS. It is a unique approach to computer network infrastructure management

and currently the only such contract in DoD. Although the contract was awarded in late

2000, the ramifications to computer/information-related operations throughout the Navy

and Marine Corps are still unknown. Individuals involved with the MARCORSYSCOM

KM effort and those assigned to the CIO office found themselves having to constantly

negotiate obstacles associated with the NMCI implementation. Besides the lack of

available information about the specifics of local implementation, completion of

regularly simple tasks necessary to maintain current operations became difficult as

personnel billets and associated monies were lost. Major Kim Whitehouse, Chief of the

Applications and Development branch, described it like this:

> "…what's happened is they put a line in the sand that said, okay, money
>
> goes away and billets go away as of this date, which was about a year ago.
>
> Now, NMCI slipped but no one is provided relief for that."

Difficulty of coordinating with the "other" IT organization. Although the mission

of the MARCORSYSCOM CIO's office—the home of the KM program—was to provide

IT support and services to MARCORSYSCOM, it was not the only IT organization of the

Marine Corps. The MARCORSYCOM CIO office was seen as local IT support while

the C4ISR (Command, Control, Communications, Computers, Intelligence, Surveillance

and Reconnaissance) Integration Directorate, also a MARCORSYSCOM entity,

specifically the Program Manager for Information Systems, had the responsibility for

providing service-wide information systems. Although the respondents did not indicate

direct conflict with the C4ISR organization, it was apparent that their philosophies and

approach to KM were somewhat disjointed and incongruent. Having a steady funding

stream, the C4ISR Directorate was able to pursue IT/information related projects, such as

Virtual Program Managers System (VPMS), without necessarily coordinating closely

with the KM effort/intentions.

Executive leadership needed to guide/arbitrate information "owner" and

stakeholder issues. The inherent difficulty of coordinating across organization

boundaries was one of the primary drivers for the formation of the KM Design Team.

Once the MARCORSYSCOM leadership decided to support the KM effort, they knew it

was essential to put together a team that could marshal expertise and cooperation from

across the command. Although the KM Design Team had many KM successes, it still

remained difficult to get people and organizations to share information. For instance,

during the creation of the staff directory application, it was found that individuals were

sabotaging official information about themselves so that it would not be available to

others. From a stakeholder perspective, it was hard to get individuals to use the

applications as they had been designed. Moreover, surveys built to address customer

needs/desires for the TIGER system showed that customers were only somewhat satisfied

with what TIGER currently offered. The involvement of the official command Change

Agent, Randy Delarm, was another key to improving coordination/integration between all

parties on a variety of issues, but many challenges remained.

Control Factors

A variety of control-related factors were identified by the MARCORSYSCOM KM staff as being barriers to their KM effort.

Restrictive impact of external control policies. The existence of external control policies in regards to technical infrastructure issues and software standards was often seen as frustrating and often unnecessarily restrictive. Because the CIO's office (and KM program home) was an IT organization, it was particularly aware of the need for IT control policies and standards and made every effort to comply. However, the Navy-mandated NMCI initiative and the non-standard nature of KM projects/software often made progress difficult. As for the impact of NMCI, monies for certain IT functions, such as applications programming, had been taken away. Billets for IT personnel, both civilian and military had also been removed or remained unfilled. These resources were redirected to the NMCI contract without consideration of the fact that existing workloads and performance expectations at the local level were not reduced. These constraints made the accomplishment of existing tasks, much less new tasks such as KM, almost impossible.

The inflexibility of existing software standards policies also made the procurement of KM applications troublesome. Again, the CIO shop understood the necessity of standardization for many software products, but the KM products they needed to procure were, in many cases, non-standard. Major Kim Whitehouse described the situation as follows:

> "…the Marine Corps, right or wrong,…heavily leans on Microsoft
>
> products. So anything that's not a Microsoft product is from the C4I
>
> perspective something less than optimal…And the argument we use on
>
> our side is that we're not a regular fleet unit. We have a different mission,
>
> and we require different capabilities. And so any standard Microsoft
>
> products that were out there wouldn't meet the needs."

Additionally, it was found that the individuals who actually evaluated and approved the

software procurement requests were often uneducated as to the nuances of the software

the CIO's office was requesting. Major Whitehouse and her staff often found themselves

having to re-educate such individuals. She described one particular instance:

> "Lotus Notes Domino used to be on the approved list. Lotus client used to
>
> be on the approved list.   It [Lotus client] is no longer on the approved list,
>
> but Domino [still] is. And there's a lot of confusion from a …group of
>
> people making policy with a heavy Microsoft background. They can't
>
> differentiate between Lotus Notes client and Lotus Domino."

Lack of internal control policies. As the TIGER system grew from the staff

directory to other applications, the KM team realized the need for a variety of control and

management policies. Although they had not yet had the time to dedicate to such

activities, they recognized a need in the following areas:

- content management,

- taxonomy development, and

- culture transition guidelines.

Despite the fact that TIGER had only been operational for a little more than a year, issues regarding content management were already surfacing. The main content management issues to date involved information ownership, information decay, and archiving. Sorting out issues associated with all three had not been simple and very little progress had been made. Regarding information ownership and decay, there existed a lack of guidance that described who was responsible for what information and how it should be maintained. Lt Col Houck stated,

> "We still know who the owner is pretty much from the information. It's
>
> just a matter of getting to know them and getting them to validate it. We
>
> don't have anyone in charge of content management. It's a big problem."

Closely related to these matters was the subject of archiving—what to archive, how and when. Lt Col Ben Alegretti, the inbound CIO, mentioned that the archiving "piece" would be extremely hard to address given that the Marine Corps had traditionally not been good archivers or records managers even in the paper-based era.

Another concern was the lack of an existing taxonomy on which to control and organize the ever-growing amounts of information and knowledge available through TIGER. Lt Col Houck cited "taxonomy" as the next application he would pursue if time allowed. Initially, it was thought that a search engine would obfuscate the need for a robust taxonomy. What had been discovered, however, was that many customers were not satisfied with the search engine results—many searches, especially key word searches, had to be refined and refined again. Sometimes the searches would not return anything of value.

Lt Col Houck also identified the lack of existing guidance on how to address the human piece of KM implementation both for leaders and followers. Not only were there no firm rules for him or the other executive leaders to follow in leading the KM effort, but there were no firm rules to offer to individuals/organizations trying to implement KM culture changes at their own levels. He and others were well-versed in the IT piece of the initiative, but most of the effort had to focus on the people/culture issues.

Negative impacts of social control. The reward system put in place to encourage civilian worker participation in the KM effort was an extremely positive element of social control exercised by the MARCORSYSCOM leadership. In fact, in the spectrum of cases investigated during this research, MARCORSYSCOM was the only organization found to have such a formal system in place. Despite this positive effort, respondents did recognize two potential negative elements of social control. The first involved what some respondents identified as a forced culture change. They felt that the KM effort had been pushed too hard and had happened too fast. As a result, individuals had not had time to adjust their work habits and/or their philosophies about KM/KM benefits. Of particular concern was the fact that creation of the TIGER system had forced some applications/information sources offline and folks were forced to use the TIGER system whether they wanted to or not/whether it served their purpose or not. Many felt that TIGER had been forced upon them without due consideration of all impacts. Another related point was the fact that individuals did not feel at ease to discuss negative aspects/impacts of KM proposals with the current leadership. The "can-do" culture of the Marine Corps did not support the sometimes necessary discussion of drawbacks,

limitations, and disagreement. Although the MARCORSYSCOM KM Design Team and

technical staff accomplished a great deal in a short amount of time[13], the negative

impression left in the mind of many customers was an issue that made continuing the KM

implementation even more difficult.

Measurement Factors

"Measuring" and or "valuing" the contribution of KM to the organization was

presented by the respondents as a relevant concern. The main issues involved

measurements needed for leadership support, the lack of appropriate

measurements/metrics, and the detrimental impact of metrics to culture change.

Measurements needed to gain leadership support. Although there was no

evidence that executive leadership had required hard numbers or measurements to justify

the KM effort, it was the impression of many of the respondents that without at least a

proof of concept, leadership backing could not be obtained. Basic metrics, in the form of

TIGER website use statistics, were used to brief the leadership and to help ensure their

continuing support.

Lack of appropriate measures. In trying to provide quantitative measures of their

success both internally and externally, the KM program team constantly struggled with

the lack of appropriate measures. When asked about metrics, Major Kim Whitehouse

stated, "How do you convince people of the time saved from the phone call you didn't

---

[13] The outstanding accomplishments of the MARCORSYSCOM KM effort were recognized in 2000 when it won the Navy's Knowledge Sharing Award for "Innovative Knowledge Sharing in the Marine Corps."

get?" Despite the existence of qualitative stories that described the impact and benefits of

KM, TIGER website use statistics and survey results were the primary source of

quantitative measurements. The limited value of these kinds of measurements was

understood, yet they provided a necessary snapshot view to leadership.

Metrics used detrimental to culture change. Although the quantitative measures

seemed to satisfy current leadership, some respondents noted that use of such metrics to

show success of TIGER and the KM effort was actually detrimental in facilitating

cultural change. It was stated that users were well aware of how the metrics were

calculated, and many were wary that they did not accurately depict usage patterns. One

respondent gave this example:

> "[TIGER] automatically comes on when you log in in the morning.
> So a million hits. Hey, that's great! Look, a million people went in there.
> Well, wait a minute. You don't have a choice. So there are some things
> in there that may be giving false perspectives on the number of hits, etc.
> How many of that were people really trying to get information out of it, or
> how many of them were just looking around trying to find something. So
> while that does give you some indication of usage, you kind of have to
> take that with a grain of salt."

Despite the necessity of using available metrics, it was noted that such actions

could actually have had a negative impact on the intended culture change.

Overall, the MARCORSYSCOM case study indicates there are a variety of

managerial influence factors that acts as barriers to organization KM. Table 16 below

summarizes these influences.

Table 16. Summary of Managerial Influence Findings for MARCORSYSCOM

Influence Factor	MARCORSYSCOM Findings
Leadership	- Lack of initial leadership commitment at higher levels - Lack of confidence about continuing leadership support - Lack of reinforcing behaviors - Difficult to "sell" KM concept - Difficult to lead KM effort
Coordination	- Difficulty of negotiating NMCI initiative - Difficulty of coordinating with other IT organization - Executive/steering committees needed to guide/arbitrate info owner and stakeholder issues
Control	- Restrictive impact of external control policies - NMCI policies - Software standards - Lack of internal control policies - Content management - Ownership of info/knowledge - Information decay - Storing/organizing info/knowledge - Taxonomy development - Culture transition guidelines - Negative impact of social control - Perceptions of forced culture change - Inability to discuss negative issues with leadership
Measurement	- Measurements needed to gain leadership support - Lack of appropriate measures - Measure used perceived as detrimental to culture change

Resource Influence Factors

The purpose of the second research question was to identify resource influence factors that act as barriers to organizational knowledge management. In investigating the question, financial, human, material, and knowledge resources were addressed.

Financial Resources

Lack of adequate funding. The central difficulty in the development, growth, and implementation of the MARCORSYSCOM KM effort was a consistent lack of funding. The fact that the Marine Corps is such a small service without its own dedicated budget (the Department of the Navy controls the budget) only served to exacerbate financial woes. Mr. Riordan stated, "[We've] had to beg, borrow, and steal to get funding to do anything with this." The lack of necessary funding had been encountered at every stage of the KM effort. Lt Col Houck had not been able to acquire critical consultant help at the onset of the effort, KM software choices had been selected with a heavy emphasis on cost as opposed to performance, and NMCI continued to drain funds pre-programmed for additional TIGER applications, improvements, and manpower. Respondents reported that KM projects certainly were not ranked at the top of the list when it came to dividing up limited dollars. In fact, at the time of the case study, funds were so short that TIGER programmers were directed to perform maintenance-only tasks. Another respondent, remarking about the knowledge center component of TIGER, stated that it was his assessment that MARCORSYSCOM had gotten about as far as it could go until such a time as that they could get some real, tangible dollars so that they could bring in professional contractors to help extract tacit knowledge. Overall, the respondents

expressed grave concern about the funding situation and, as a result, the continued

viability of the entire KM effort.

Despite the fact that finances had been and would continue be a significant issue,

the MARCORSYCOM people knew of many creative ways to procure funding. From

participation in testbed programs to procuring OSD–level funding, they knew how to find

funds. Although the financial outlook was bleak, the possibility that a solution would be

found was not unimaginable.

Human Resources

Lack of manpower availability. The lack of adequate funding contributed to a lack

of manpower necessary to accomplish all facets of the MARCORSYSCOM effort. The

lack of manpower was evident at the KM technical team level as well as at the user level.

As described by Major Whitehouse, the technical programming work that had once been

accomplished by at least six contract programmers was now being covered by two. The

military positions were no longer being backfilled either. The lack of manpower was also

evident at the user level where respondents stressed that they "just didn't have time" to

do everything, including KM, that was asked of them. Although the KM effort was

integrated with the command transformation effort at a conceptual level, respondents still

indicated that the extra activity and work generated by the transformation effort was

overwhelming. The requirement for many workers to accomplish their primary job,

participate in the transformation effort and the KM effort, made it impossible for them to

focus on or commit to any particular issue. Respondents repeatedly stated that the KM

effort, specifically, had been hampered because so many individuals could only be involved on a part-time basis.

Negative impact of turnover. The impact of turnover was also a significant human resource issue. Although frequent turnover of military personnel was an accepted part of the military culture, it nevertheless continued to adversely impact the MARCORSYSCOM KM efforts and the capture of intellectual capital throughout the Systems Command. The fact that a large portion of the Marine Corps acquisition corps was military (a larger portion than any other service) made turnover a significant issue in general. The theory in the other services had been that the acquisition corps should consist of about 30% military and 70% civilian personnel to ensure continuity—the composition of the Marine Corps acquisition corps was almost the exact opposite. Efforts to re-balance the Marine Corps acquisition corps personnel mix were ongoing at the time of the case study but was still recognized as a significant issue. Civilian turnover was also a concern. The impending departure of many retirement age civilian workers was a serious point of consideration. Although the turnover issue was used as a selling point for the KM effort, they also negatively impacted it as well. Personnel turnover, in many ways, thwarted the MARCORSYSCOM KM efforts by precipitating the need to constantly re-train and re-educate new leaders and personnel. At the same time, however, it provided a key motivation and necessity for continued KM efforts

Lack of knowledge, expertise and skill. As was mentioned previously, many of the individuals on the KM Design Team and CIO KM program staff were committed to KM effort on a part-time basis only. Furthermore, very few of these individuals had any

previous KM background or training. This made it hard for the KM effort to gain inertia on its own.

Material Resources

Limited options for KM system hardware/software. The lack of financial resources limited many of the options available for KM system hardware and software. Despite the service tendencies toward Microsoft products, they simply cost too much and the KM solution required additional hardware. The alternative, Lotus Domino, had been chosen because it bundled everything together—Quickplace software, Domino extended search engine, and the Domino web server. The KM technical team also found itself borrowing code from other military KM efforts in order to reduce costs. Although the KM team expressed satisfaction with the Domino products, some did acknowledge that some of the applications were not very robust and/or intuitive.

Existing systems inadequate. While the KM team had been satisfied with the performance of Domino, it did recognize, as did customers, that some of the applications were not very easy to use. This situation frustrated its efforts in convincing users that TIGER offered them something better than what they had had before. Additionally, TIGER still did not incorporate all the functionality necessary. For instance, the new TIGER tasker system did not replace the existing command tasker system. In essence, they ran side by side which was both confusing to users and inefficient. The challenge ahead for the KM team was to evolve TIGER into a system that satisfied and served all its customers.

Knowledge Resources

Human knowledge resources. Human knowledge resources are described by

Holsapple and Joshi as the "raw materials" for knowledge activities (2000, p. 241).

Human knowledge resources in MARCORSYSCOM were extensive. It was

acknowledged that KM needed to be used to help stem the impending drain of these

knowledge resources due to the retirement of many civil service employees and the

turnover of military personnel.

Lack of "knowledge about knowledge management". The "lack of knowledge

about knowledge management" was a battle the MARCORSYSCOM KM team faced on

many fronts. This was an unexpected finding given the strong and well-regarded

Department of the Navy KM program. First, the original initiator of the KM effort, Lt

Col Houck, readily admitted that he had to learn about KM through site visits, reading

literature, through contacts, and learning by doing. Others that became involved in the

KM effort typically learned in much the same way and from each other. The lack of

knowledge about KM was also evident at the executive leadership level as well as

throughout the MARCORSYSCOM population. Mr. Randy Delarm, Command Change

Agent, remarked, "It's hard, first of all, to understand the concept of knowledge

management for most people. I had to hear it probably five or six or seven times, and I

still get little subtle understandings of what it's all about." Besides dispelling negative

images of KM, the KM team had to constantly educate and sell KM concepts and

philosophies. The time the team spent performing these tasks was time it could not

commit to TIGER system development and other critical KM implementation issues.

Lack of tacit knowledge capture. Despite the recognition of the importance of tacit knowledge, very little was currently being captured. Tacit knowledge contribution to the knowledge centers and other repositories was certainly encouraged, but it had not happened to a large extent. As a result, Mr. William Gookin, MARCORSYSCOM Chief Knowledge Officer, was actively pursuing strategies to facilitate and increase tacit knowledge capture. It had been the experience of many respondents that it was almost impossible to get individuals "to put things in" the TIGER system if it required work above and beyond their daily duties.

Lack of knowledge about future KM strategy. None of the respondents interviewed expressed any strong ideas about the future of the MARCORSYSCOM KM effort. They did express a strong belief in the merits of KM, but did not possess a solid vision about how the program would evolve beyond its current stage. The uncertainly associated with new command leadership, NMCI, and the budgetary situation appeared to have stalled progress, at least for the moment. Although the pause could be seen as beneficial given the pace at which the KM effort had proceeded so far, some respondents indicated that the slow down could signal the beginning of the end of the KM program as they knew it.

Incompatible/Inaccessible knowledge/info stores. Given the way the TIGER system had been built, the incompatibility and/or inaccessibility of existing information and knowledge stores had not yet become a big concern. Lt Col Houck, however, did state that he thought it would become a big problem very soon. In order to develop the

staff directory, the KM team had pulled together nine separate databases containing human resource data. They structured the data for TIGER as they saw fit, but realized this would not always be the case. Lt Col Houck mentioned that the KM technical team had made every effort to comply with the data standards established by the command IT organization. They also knew, however, as future KM applications began to cross organization boundaries and make use of legacy systems, incompatibility and inaccessibility issues would be on the rise.

Lack of knowledge about KM-supportive organizational culture. The knowledge of organization culture is a human knowledge resource that significantly impacts the implementation of KM. The lack of a widespread KM-supportive culture was recognized by the MARCORSYSCOM Design Team as the biggest barrier to their knowledge management effort. Lt Col Houck stated that 100% of his time was committed to people problems, not IT problems, associated with implementing KM. Aspects of the Marine Corps culture—the tendency to rush initiatives and the "can-do' attitude-- were also identified as hindering KM efforts. Evidence of the lack of a KM-supportive culture could be seen in the many instances of resistance to change.   The KM program team's first experience with building the staff directory and the subsequent revolt and sabotage by many users made it apparent that resistance to change was a serious issue to be dealt with. From individuals who did not want to change their daily routines to whole organizations that still hung onto the idea that knowledge is power, the KM team constantly fought an uphill battle in bringing KM-related improvements to MARCORSYSCOM. One respondent remarked, as evidence that the culture had not

changed, that people were being forced to use the TIGER system and as a result they were not committed to conceptualizing and/or extending uses for the system. As the KM team has delivered more successes, their battles have become fewer, although a complete culture change is most certainly still in the offing. Overall, the positive reinforcement of KM concepts and the use of TIGER by the MARCORSYCOM leadership have allowed for great progress in the journey to culture change, but the KM team realizes they still have many challenges ahead.

Overall, the MARCORSYSCOM KM case study indicates there are a variety of resource influence factors that act as barriers to organization KM. Table 17 below summarizes these influences.

Table 17. Summary of Resource Influence Findings for MARCORSYSCOM

Influence Factor	MARCORSYCOM Findings
Financial	• Lack of adequate funding
Human	• Lack of manpower availability • Negative impact of personnel turnover • Lack of KM knowledge, expertise, and skill
Material	• Limited options for KM system hardware/software • Existing systems inadequate
Knowledge	• Lack of "knowledge about knowledge management" • Lack of tacit knowledge capture • Lack of knowledge of future KM strategy • Incompatible knowledge/information stores • Lack of knowledge about KM-supportive culture

Environmental Influence Factors

The purpose of the environmental influence factor category according to Holsapple and Joshi (2000) is to capture and separate those influences that are external to the organization being examined. For the purposes of this research, the definition of

"external" was defined as outside the confines of the immediate KM program

organization. In the case of a large military organization such as the Navy/Marine Corps,

influences at the major command levels and higher can be considered external to

organizations such as MARCORSYSCOM. The influences discussed below were

considered external to MARCORSYSCOM (and the KM effort) but all such influences

weren't necessarily external to the Marine Corps as a whole.

GEPSE Climate

The GEPSE climate impacts all aspects of the military organization. The

influences of this climate are passed on to the military through political channels as well

through military leadership and the individuals who serve. Recognition of these

influences, however, at the lower levels of the organization hierarchy is almost non-

existent. In the case of the MARCORSYCOM respondents, the influences of the GEPSE

climate were regarded as much more indirect than direct.   *Negative impact of politics*.

Of the respondents interviewed, few spoke direly about the influence of politics at the

local or higher level. A variety of comments, however, implied that certain elements of

politics had a negative impact on KM. One respondent noted that some individuals had

chosen to work on the KM effort, through working groups, committees, etc., because it

was a hot topic and it was good to be "seen" and "involved" in such efforts. Another

respondent mentioned the lack of earnest feedback given to top leadership regarding KM

issues. Mr. Jim Riordan summed up the situation by saying, "The military, I think, has

an added layer of politics and bureaucratic-ness"…."

Negative images of KM. The MARCORSYSCOM KM team constantly battled the image of the KM effort as being a fad, an extra project or something above and beyond regular duties. These negative images were understandable given the sometimes bad press KM got in the media and the ramp-up work that was necessary to get the effort going and the TIGER system built. The team knew that changing user and leadership perceptions about KM was a challenge that would continue for quite some time.

Fears about stolen identity/privacy. The backlash that resulted as a result of the creation of the TIGER staff directory component made it obvious that there were growing fears in society regarding safety and security of personal information in a digital environment. The KM Team expected a certain level of resistance to change, but what they witnessed with the staff directory greatly surprised them. The initial approach to the directory was to allow individuals access to their own information so that they could update it as necessary. However, when the directory became operational a number of employees attempted to sabotage their own personal information by blanking out fields and by giving misleading information. Some did not want to be listed in the directory at all. Although the same information had been available in various forms across nine different databases before consolidation into TIGER, something about the new system made individuals very leary and suspicious. This event slowed down the initial KM effort and required the implementation of new policies that limited individual control over their own information. It also made the KM program staff much more aware of the concerns of their customer/user population.

Negative impact of "stovepiped" culture. The functionally stovepiped nature of the Marine Corps and the services in general was seen as an impediment to KM efforts. MARCORSYSCOM had attempted to address the problem at the local level by creating functional integration teams (teams composed of the chiefs of each functional area) and cross-functional teams (teams composed of individuals with the same skill sets across product groups). Mr. Randy Delarm, Command Change Agent, stated,

"That's a major piece of both our human system design and the way we

are managing careers in the future of the organization. That, I think, was

greatly influenced [by] knowledge management principles and becoming a

knowledge-centric…learning organization."

Technology

Adverse impact of proliferation of KM products/vendors. Overall, MARCORSYSCOM had benefited from the numerous and varied KM products available on the market. The wide range of choices and vendors gave them the opportunity to choose those which best fit their purpose and budget. From a negative perspective, however, the number of offerings and implementation examples (which they viewed at various organizations) made it hard for the KM team to decide which option was best. The challenge continued to be to make the best decisions in light of tight resource constraints.

Competition/Fashion

Limited KM crossfeed between services. Competition between services in the area of KM was not recognized as a negative influence at MARCORSYSCOM. In fact,

respondents gave quite a few examples where they had benchmarked against other military organizations with ongoing KM efforts. In some cases they even ported existing software code from these organizations to further augment TIGER. The only negative aspect of this situation as acknowledge by respondents was that crossfeed (i.e., information exchange) between the services regarding KM was limited. The MARCORSYSCOM KM team had actively sought out the advice and contact from other military organizations, even though there was no formal mechanism to facilitate such crossfeed on an ongoing basis. Whatever the MARCORSYSCOM team learned about other military KM efforts was due solely to their initiative to make it happen.

Time

Lack of time. All of the respondents stated in one manner or another that the lack of time has negatively impacted their KM efforts. The lack of time has acted as a barrier to KM in today's fast-paced environment in that there seems to be less and less time to tackle new initiatives, develop new systems, capture individuals' attention about new concepts, and to experiment with new ways of doing business. The additional workload associated with the MARCORSYSCOM transformation effort further exacerbated time shortages.

The MARCORSYSCOM case study indicates that there are a variety of environmental influence factors that acts as barriers to organization KM. Table 18 below summarizes these influences.

Table 18. Summary of Environmental Influence Findings for MARCORSYSCOM

Influence Factor	MARCORSYCOM Findings
GEPSE Climate	• Negative impact of politics • Negative image of KM • Fears about stolen identity/privacy
Technology	• Adverse impact of proliferation of KM vendors/products
Competition/Fashion	• Limited crossfeed between services
Time	• Lack of time

Summary of Influence Factors for MARCORSYSCOM

In summary, this chapter has presented the findings from the case study of the

Marine Corps Systems Command KM effort. Using Holsapple and Joshi's (2000)

framework as a guide, the three classes of influence factors—managerial, resource, and

environmental—have been examined. The findings suggest that a variety of influence

factors act as barriers to implementing and executing organization knowledge

management. Some findings are particularly unique to the military. These findings are

compared to the five additional case studies.

CHAPTER EIGHT--NAVAL FACILITIES ENGINEERING COMMAND[14]

Organization and KM Program Profile

Organization Structure and Mission

The Department of the Navy's three principle components, in addition to the

Secretariat, include the Shore Establishment, the Operating Forces, and the Chief of

Naval Operation's Office. The chain of command structure is shown below (Figure 55).
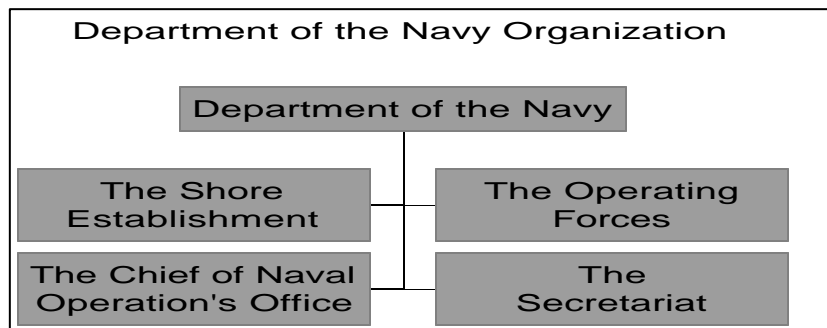
Figure 55. The Department of the Navy Organization

As stated on the Navy website (www.chinfo.navy.mil/navpalib/organization/org-shor.html,

retrieved June 12, 2002), the role of the shore establishment is to provide support to the

operating forces (known as "the fleet") in the form of: facilities for the repair of

machinery and electronic; communication centers; training areas and simulators; ship and

aircraft repair; intelligence and meteorological support; storage areas for repair parts,

fuel, and munitions; medical and dental facilities and air bases. Figure 56 shows the

organization of the shore establishment.

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[14] Information for this case, except where stated otherwise, is based on interviews conducted March 28-April 1, 2002, at NAVFAC.
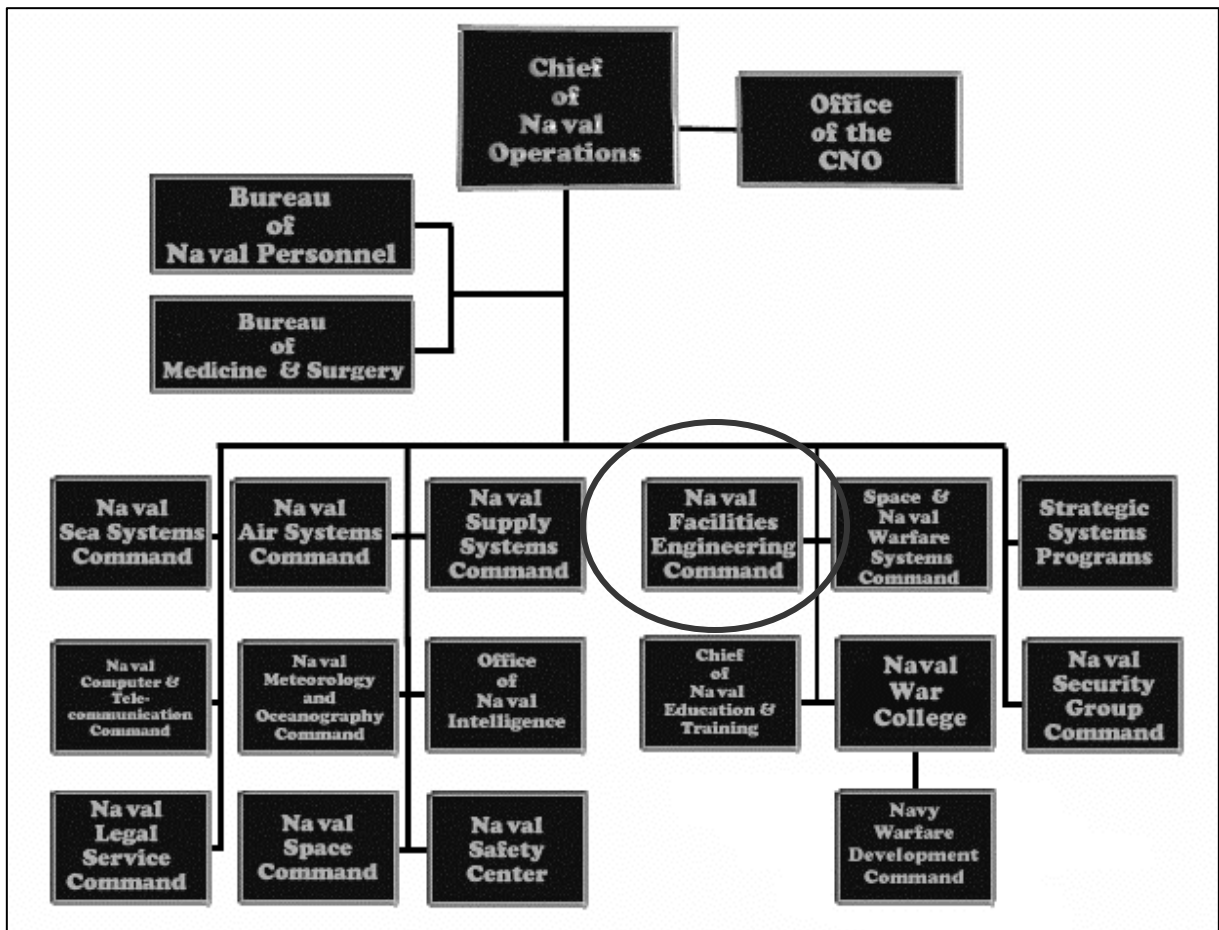
Figure 56. Organization of the Shore Establishment

The Naval Facilities Engineering Command (NAVFAC) supports the mission of the shore establishment by managing the planning, design, and construction of shore facilities for U.S. Navy activities around the world. According to NAVFAC's mission, "We provide the Navy's Forces with the operating, support, and training bases they need when they are home from the sea" (www.navfac.navy.mil, retrieved June 12, 2002). NAVFAC is a global organization with and annual volume of business in excess of $8

billion. The command employs 16,000 civilian and military personnel who work to provide solutions and alternatives in the areas of:

- Base development, planning and design
- Military construction
- Public works
- Utility and energy services
- Base realignment and closure
- Environmental programs
- Weight handling

- Military Operations and contingency engineering
- Acquisition
- Real estate
- Family and bachelor housing
- Ocean engineering
- Transportation planning and management

NAVFAC itself consists of a headquarters function as well as five field components (Figure 57)[15]. The headquarters is located at the Washington Navy Yard in Washington, D.C. and is staffed by 325 civilian and military personnel, including engineers, architects, contract specialists and professionals who manage programs and projects and provide technical expertise and policy. The field components include:

- Eleven engineering field divisions and engineering field activities, located across the U.S. and Europe which provide engineering support and services to the naval shore establishment.

- The Naval Facilities Engineering Service Center which provides specialized engineering, scientific and technical products and services on a worldwide basis.

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[15] In May 2002, NAVFAC underwent a re-organization. Although the new organization structure may impact future NAVFAC KM efforts, it is not depicted in this case as it occurred after the data collection was accomplished.

- The Naval Construction Battalion Center which provides a structured approach to global management of Naval Construction Force assets and focuses on improving logistics support.

- Specialty units that include the Naval Facilities Service center, the Naval Facilities Institute, the Naval Construction Battalion Center, and the Navy Crane Center.
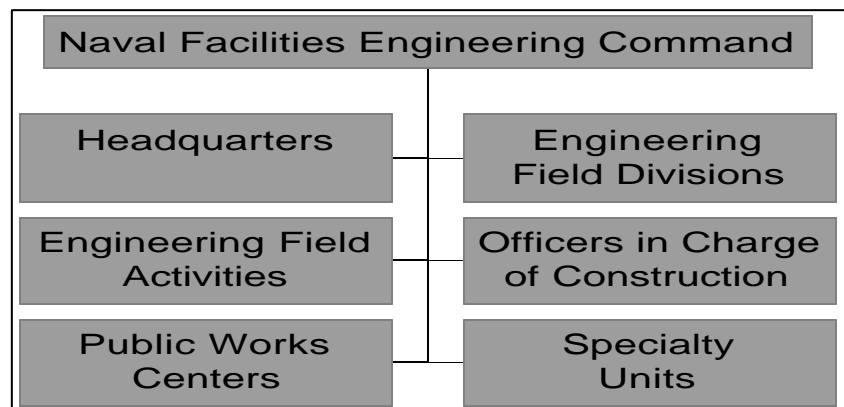
Figure 57. Organization of the Naval Facilities Engineering Command

NAVFAC KM Program "Home"

NAVFAC consists of many organizations that operate together to accomplish its mission. The NAVFAC Headquarters provides guidance to field personnel and is home to many support functions. NAVFAC Headquarters is composed of the NAVFAC Commander and Vice Commander, a command support staff, and four main groups (see Figure 58).   The four main groups include the Engineer Operations Group, the Contingency Engineer Group, the Engineer Programs Group, and the Engineer Resources Group. The Chief Engineer's Office (CHENG) reports to the Engineer Resources Group which is also the "home" of the NAVFAC knowledge management effort (Figure 59).
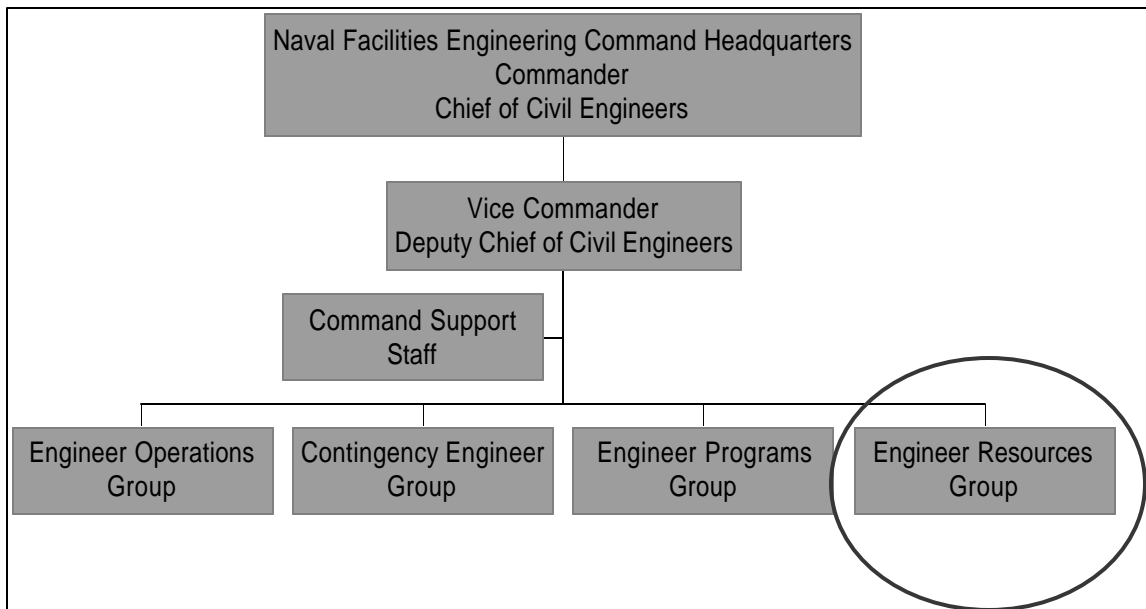
Figure 58. Organization of the Naval Facilities Engineering Command Headquarters
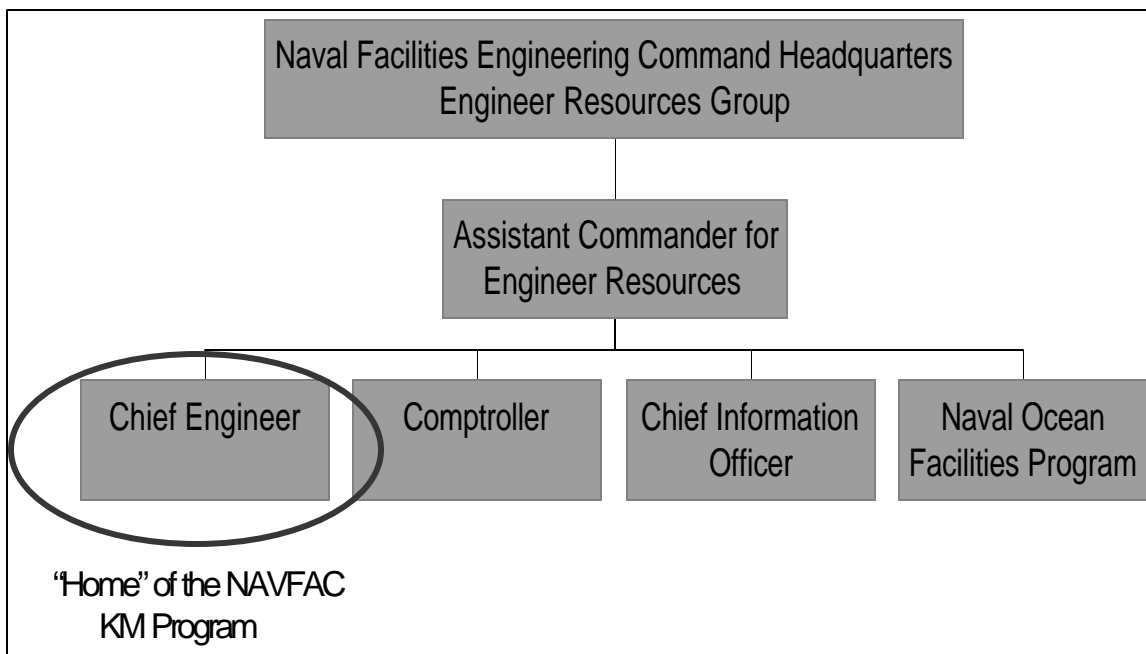
Figure 59. Location of the Chief Engineer's Office and the "Home" of NAVFAC KM

History

In 1996-97, NAVFAC suffered a drastic, across-the-board 30 percent personnel cut.   Because the organization was built around individuals with very specialized and hard to cultivate skills and expertise, the cuts were very damaging to the organization's corporate knowledge. Entire career paths were destroyed. In the wake of the cuts, the then Chief Engineer, Dr. Get Moy, began an effort to create an engineering community management program, with "community" being defined as a group of critical expertise, such as environmental engineering, civil engineering,, or fire protection. The purpose of the community management program was to help rebuild the organization's expertise by focusing on career path management, training, and education for all the critical engineering skill areas.   A year or so after Dr. Moy repeatedly briefed this initiative to the NAVFAC executive leadership, it was decided that the community management program would be expanded to all the communities across NAVFAC. Today, the community management program spans the entire NAVFAC workforce from the lowest to the highest levels. There are currently 15 communities that include engineering, public works, financial management, human resources, and others.

Although the community management effort spread across the headquarters, Dr. Moy, in his role as Chief Engineer, remained most focused on the engineering community. As he began to coalesce all his ideas about what a community management program should involve, he realized that knowledge management was a concept that brought it all together. From his perspective as Engineering Knowledge Management Support for the Chief Engineer, Mr. Clay Dean stated, "KM gave it the kinds of words

and substance that caused it to be real, to have legs." Wanting to give the community management effort more "teeth" and "substance," Dr. Moy called for help from Mr. Clay Dean, who was a Chief Knowledge Officer and was developing the Foundation Knowledge web portal[16]. In 2000, Dr. Moy directed Mr. Dean to begin work to build a corporate Intranet with the purpose of linking engineering community members and the headquarters together. The idea was to augment the very people-oriented engineering community management program (called the engineering network—E-NET) with an intranet technology tool (also called E-NET). And so was born the NAVFAC KM program.

NAVFAC KM Vision

The NAVFAC KM program is unique among the cases seen in this study in that its primary focus is a very people-oriented management program as opposed to a system-oriented information/knowledge management program. As a result, the vision for knowledge management is much more comprehensive than just a simple description of what the KM system should evolve to in the future. Given the broad concept for KM, a specific KM vision was not found to exist within the Chief Engineer's office (CHENG) or NAVFAC as a whole. An approximation of a vision can be gleaned through the words of several respondents.

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[16] Foundation Knowledge, (www.foundationknowledge.com), was built in cooperation with many other government agencies as "the knowledge management portal for facilities, infrastructure, and the environment." With a focus on computer-aided design drafting and geographic information systems (CADD/GIS), it had been the first knowledge management-type system developed and used by NAVFAC engineers.

Mr. Jim Wright, present Chief Engineer stated, "So what we are trying to do…with the E-NET as the overall enabler and the Foundation Knowledge website …is to find a middle ground." He further explained that the technologies could and should be used to facilitate communication amongst communities of practice, although face-to-face communication at certain intervals was considered absolutely necessary.

Mr. Dennis Scheessele, the E-NET manager, stated,

> "…the overall role of the E-NET (a people network, not an IT network) is …more of a broader knowledge management role in as much as they [the technical discipline leaders] not only work/assist us on developing competencies and career development plans for community management, but [also]… lead their community of practice and foster mentoring [and]… knowledge sharing across that community so we can grown engineers from the entry level, from the intern level up through the organization…so that we have…an adequate pool of competent candidates to provide for succession management as people retire or move on to other positions."

In recounting Dr. Moy's vision, Mr. Clay Dean stated,

> "Dr. Moy had a vision [that] we were going to tie all these resources together. We were going to create communities of practice and we were going to use this KM space to help senior leaders/senior engineers create the body of knowledge or knowledge centers such that we

will be able to fill these holes in the career paths, do our jobs better, and be

more supportive of our customers."

NAVFAC KM Systems

Again, the NAVFAC KM system is regarded as more of a "people" system than

an "IT" system. With that in mind, however, the following sections will describe the IT-

based knowledge management systems in use at NAVFAC.

Foundation Knowledge. The first system put into use by NAVFAC to support

knowledge management was called Foundation Knowledge (i.e.

www.foundationknowledge.com). The Foundation Knowledge website was built through

a collaborative effort between the Mr. Clay Dean, Dr. Greg Baecher of the University of

Maryland/Saffron Systems, and the staff of the CHENG office to include Mr. Dick

Bilden, Mr. Dennis Scheessele, Ms. Bonnie Fairchild, and others. . The original purpose

of the website was to provide a knowledge management portal for individuals and

organizations involved in facilities, infrastructure, and environment activities. Another

objective of the website was to support collaboration between two communities—

computer-aided drafting and design (CADD) and geographic information system (GIS)

communities. This website and the information/knowledge contained on it were

available via the Internet for any interested users. As the Foundation Knowledge portal

and effort grew it increasingly took on a tri-service flavor. This was a very positive

development because CADD/GIS issues and communities span all the services. At the

time of this case study, the effort had grown to such an extent that the responsibility for

the Foundation Knowledge portal was being transferred to the tri-service CADD/GIS

Technology Center in Vicksburg, Mississippi.

 E-NET. The primary purpose of E-NET is to be a technology tool to support

NAVFAC community management efforts, specifically the engineering community. It is

available via the NAVFAC intranet to users who are members of NAVFAC and

interested practitioners from across the Navy. Specifically, E-NET forums provide a

method by which NAVFAC personnel may solve problems through collaboration.

Previously, fifteen separate communities of practice had been identified across

NAVFAC—the engineering community being one. The leaders of the CHENG office had

further identified 31 technical disciplines within the engineering community. Each of the

technical disciplines was assigned a technical design leader (TDL). The TDL, as an

overall manager for his particular community of practice or functional discipline, was,

and still is, responsible for leading, managing, connecting, and facilitating collaboration

among all its members. Ultimately, the number of communities of practice was reduced

to 13 and the primary focus for TDLs became community management. The purpose of

E-NET was to support these TDLs in their duties as well as facilitate communication and

collaboration between community members themselves.

NAVFAC KM System(s) Components

Foundation Knowledge KM Portal

The Foundation Knowledge KM portal uses the Internet as its backbone and a central website using Asp.net as the underlying technology. It is available to Federal Agency and private sector knowledge workers. The Foundation Knowledge home page provides access to KM center, e-learning, business lines, library, and collaboration workspaces. It also provides a forum for community of practice collaboration, archiving of article and success stories, as well as links to other key KM websites and resources. A snapshot of the Foundation Knowledge home page is provided in Figure 60 below.
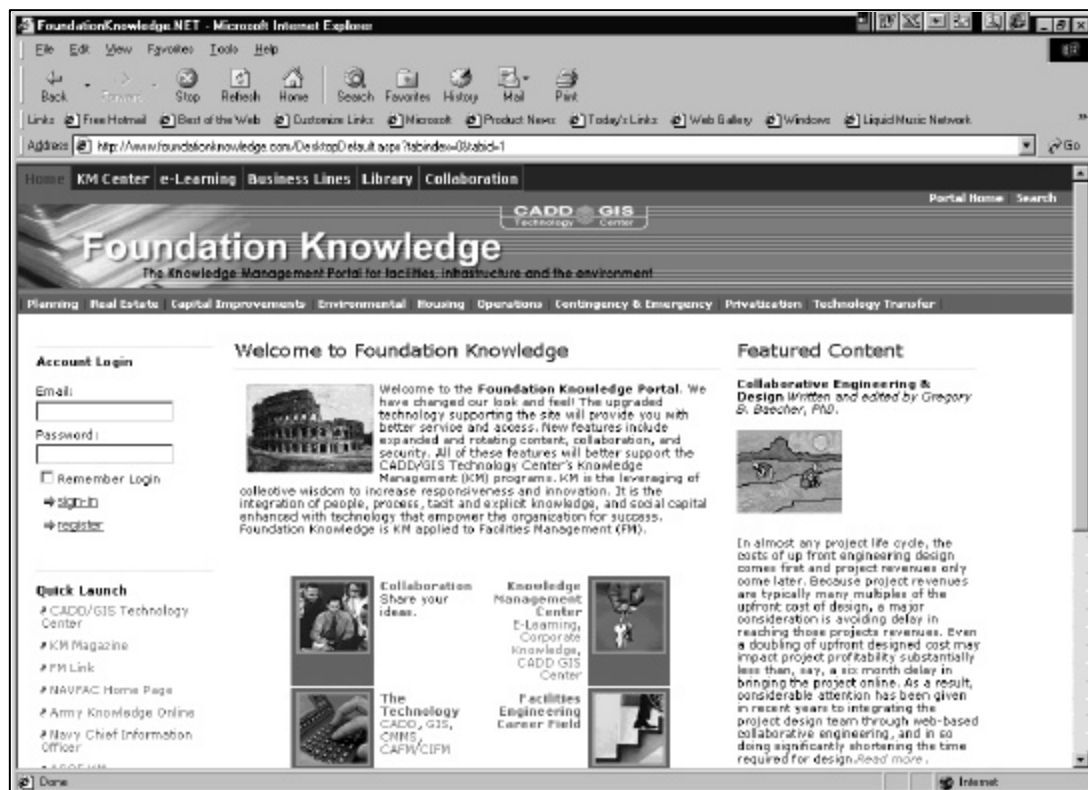
Figure 60. Foundation Knowledge Home Page

E-NET KM System

The most recent KM system, or website, built to serve the community of engineers is called E-NET. Because E-NET is also the name of the non-IT-oriented community management program, it can be confusing. One respondent stated that the community management effort had been given the name E-NET (or engineering network) name because leadership wanted to de-emphasize technology and try to emphasize the linking of people. It should be noted that the E-NET website is not equivalent to people-oriented, community management effort, but provides support for it and other aspects of the organization KM program.

The E-NET KM website is a component of the NAVFAC corporate intranet, which is nicknamed the *NAVFACilitator*. E-NET is available for access from the primary *NAVFACilitator* home page (Figure 61). The E-NET home page itself is the hub providing access to library, best practice, communities of interest, community management plan, communities of practice, technical discipline leaders, and technical centers of expertise workspaces (Figure 62)[17].

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[17] The E-NET website (format/components) was altered slightly after the case study data collection. To date the capabilities and support functions, however, remain very similar.
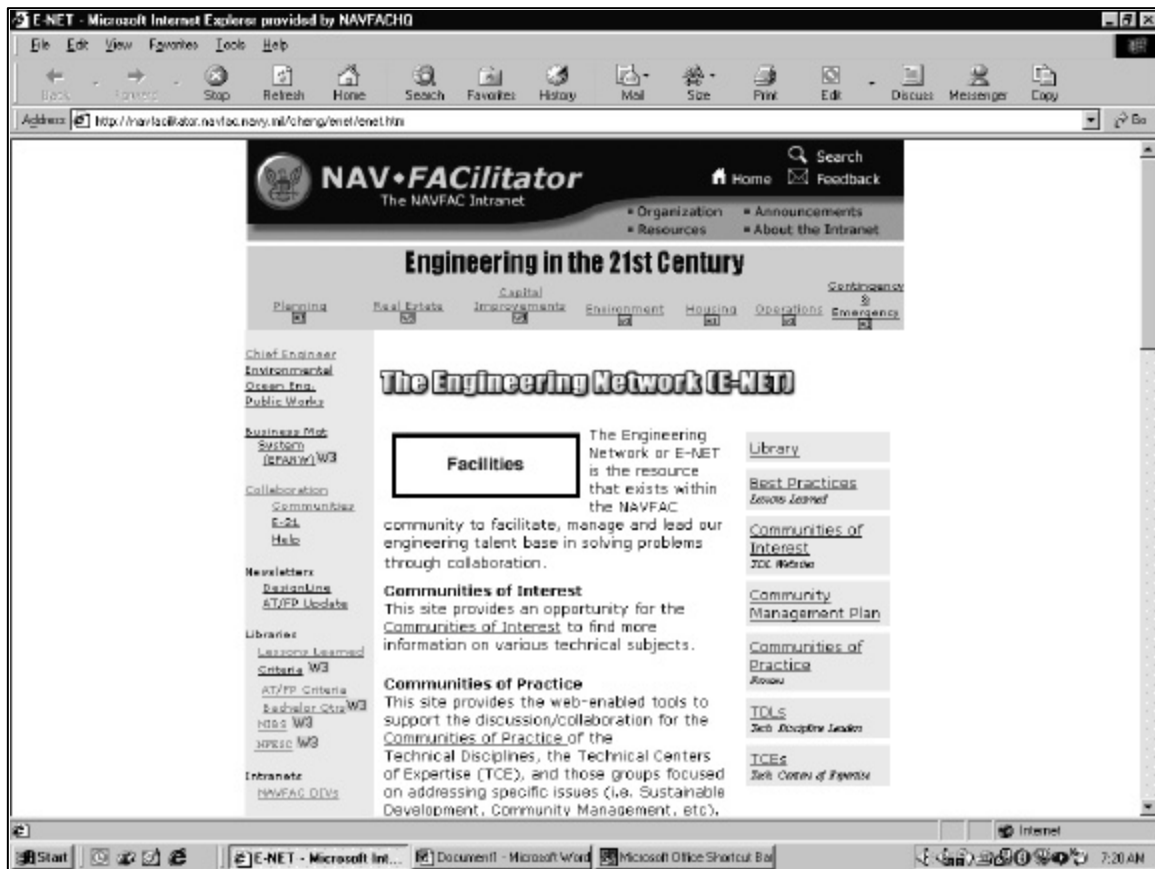
Figure 61. NAVFACilitator Home Page
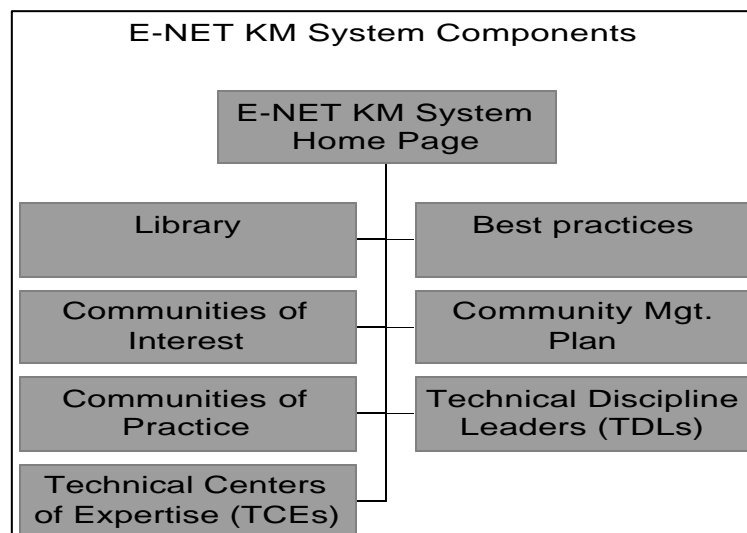
Figure 62 E-NET KM System Components

A short description and web page capture of each of the system components is provided below.

Library. The E-NET library component (Figure 63) provides a location for timely information, announcements, and documents. All technical discipline leaders are allowed to post or archive information appropriate for this forum.
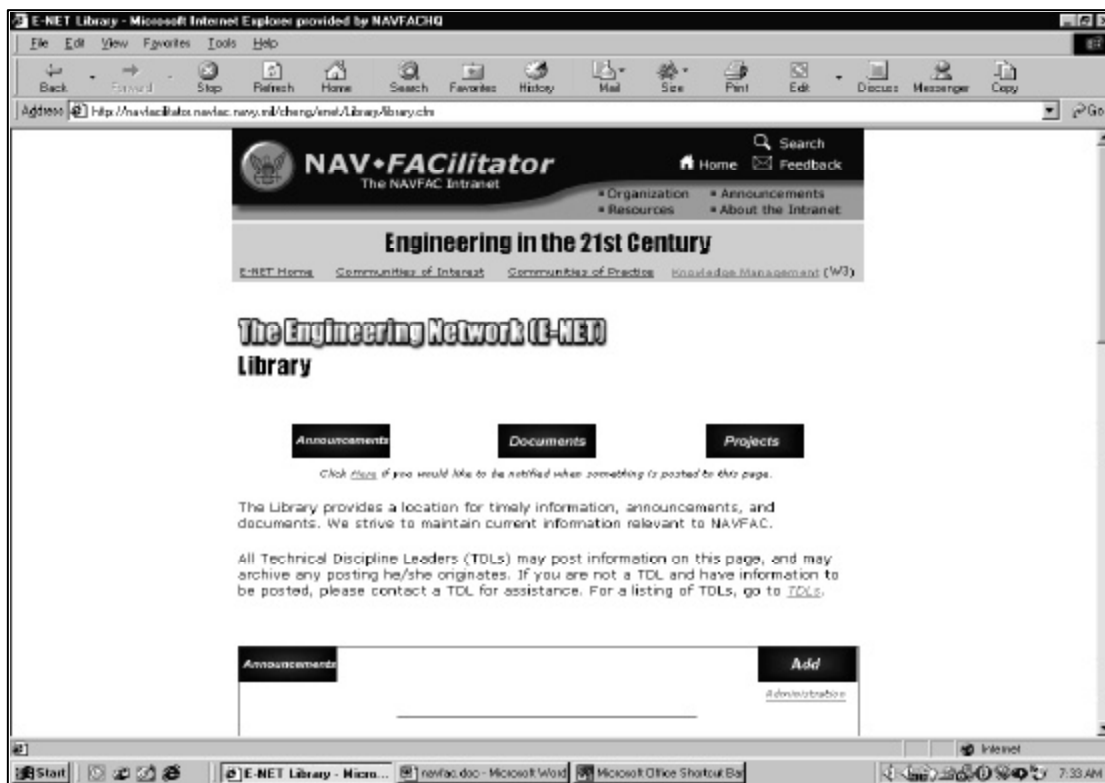
Figure 63. The E-NET Library Component

Best practices. The best practices component (Figure 64), also known as the

knowledge exchange, provides a forum for individuals to submit and review best

practices, lessons learned, and stories of success. Items submitted by individuals are

reviewed by the appropriate technical discipline leaders for appropriateness and for their

potential contribution to the community knowledge base.
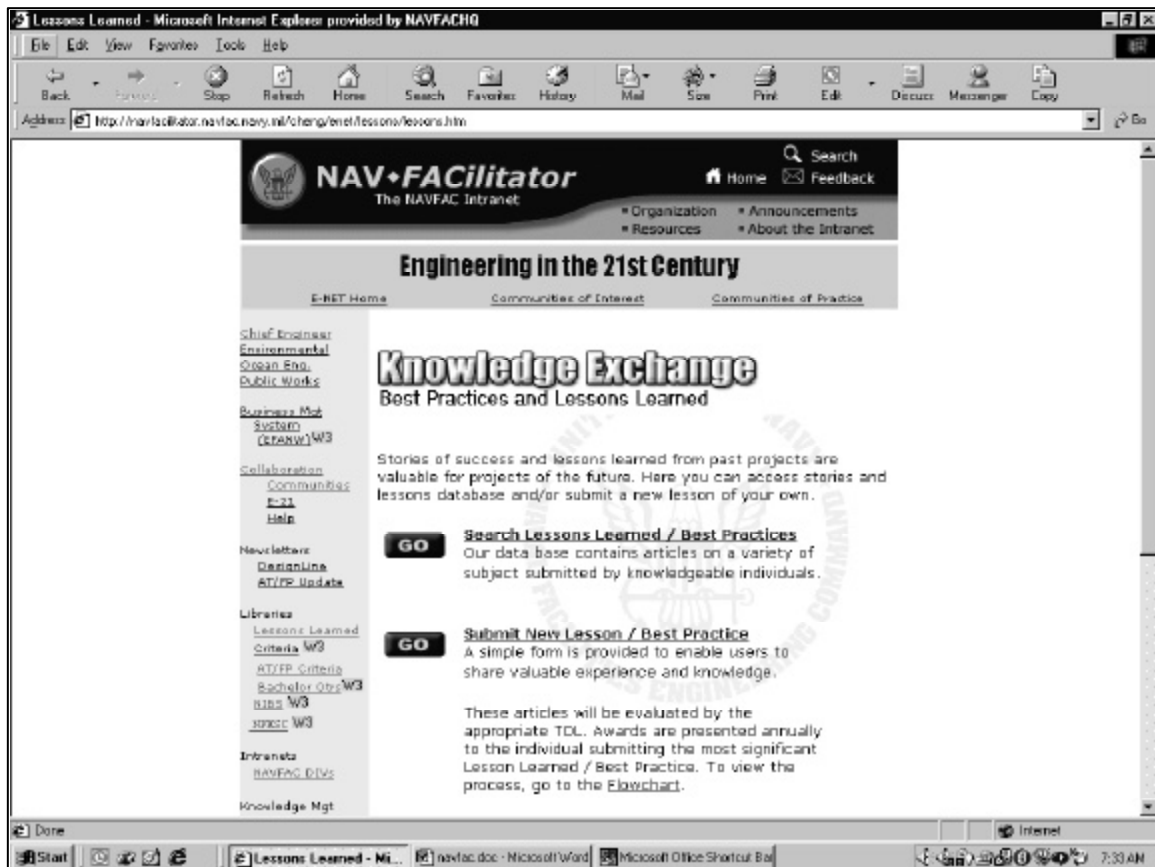
Figure 64. The E-NET Best Practices Component

Communities of interest. The community of interest (COI) component (Figure 65)

serves groups of individuals who share interest in a specific subject matter or common

endeavor. COIs organize flexibly based on needs of the organization and the

communities themselves. COIs can be led by TDLs and others based on interest/need.

NAVFAC is still in the process of defining appropriate communities of interest (COI).

Examples of COIs include hyperbaric design, architecture, and mechanical engineering.
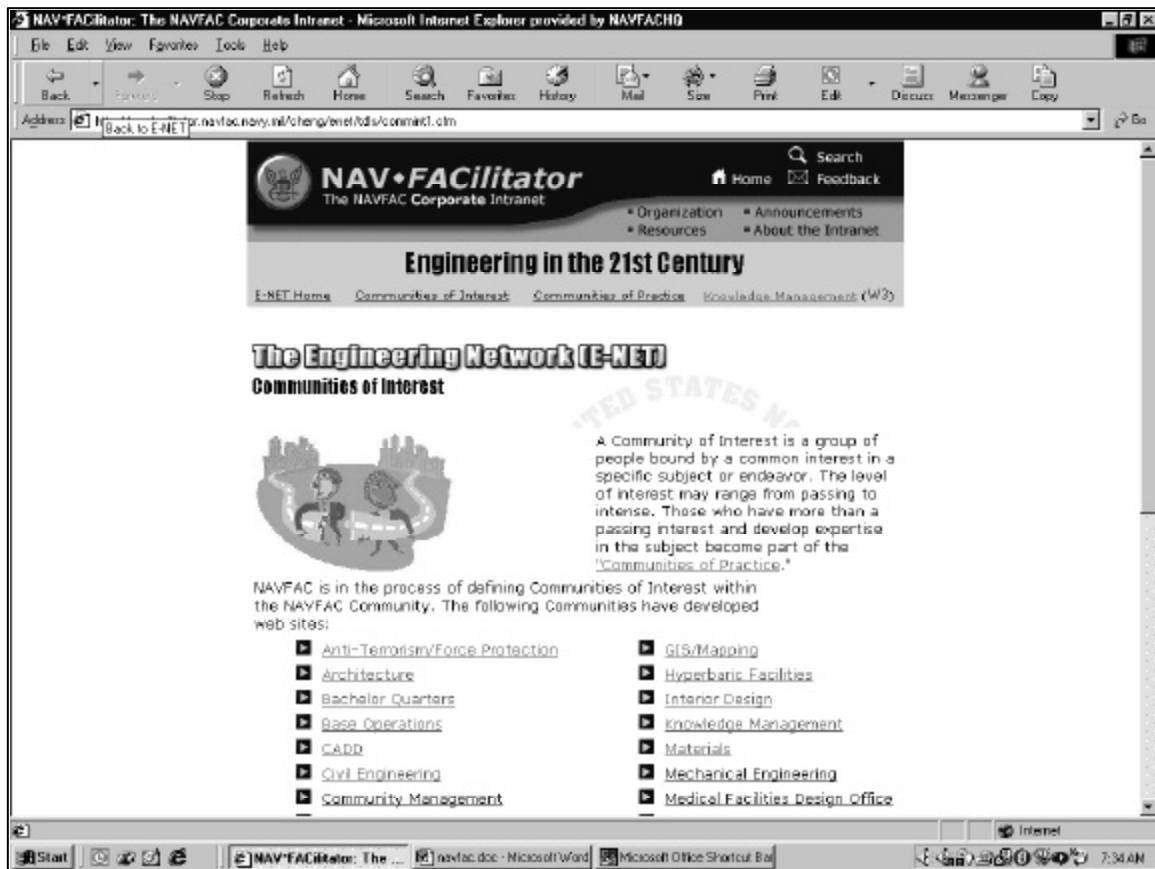
Figure 65. The Communities of Interest Component

Community management plan. The Community Management Plan component is simply a link to the community management plan document. This document outlines the career paths of NAVFAC's engineers. It provides a framework of the requirements of each level within NAVFAC, so that individuals may be informed of training and other requirements for their career advancement.

Communities of practice. The community of practice component (Figure 66) serves practitioners bound by shared expertise and a passion for joint endeavor. It provides a forum for sharing that helps to solve problems, create synergies among individuals, and build the corporate knowledge base. Some examples of existing communities of practice include: fire protection engineering, interior design, pavements, CADD/GIS, etc.
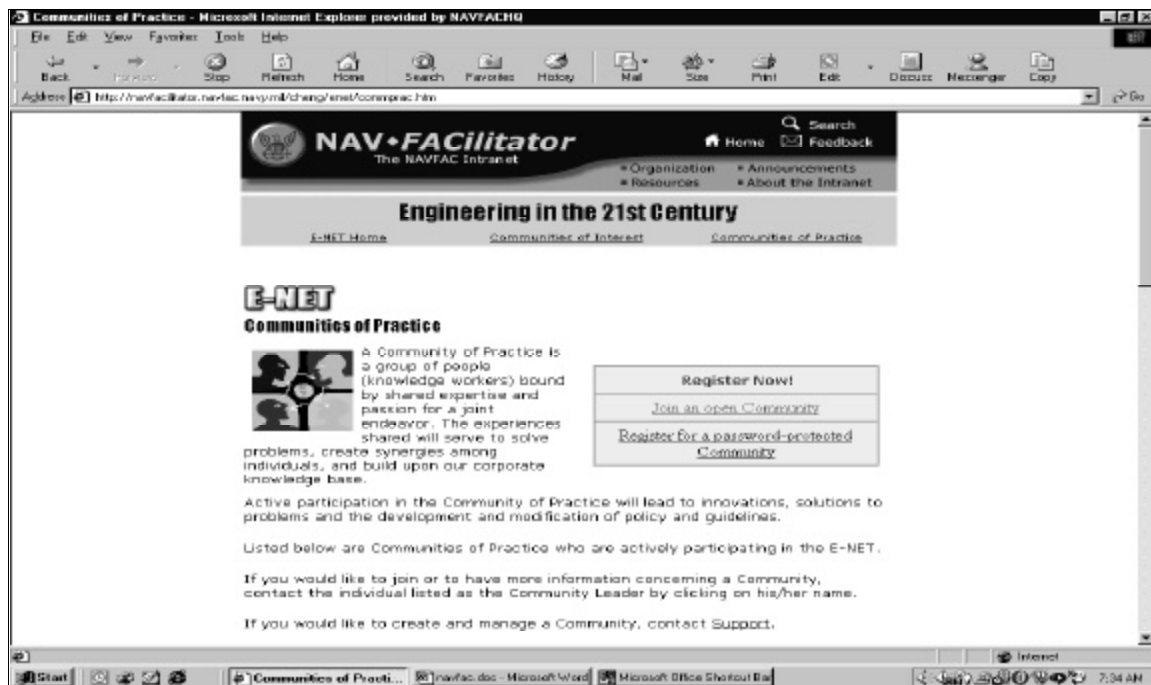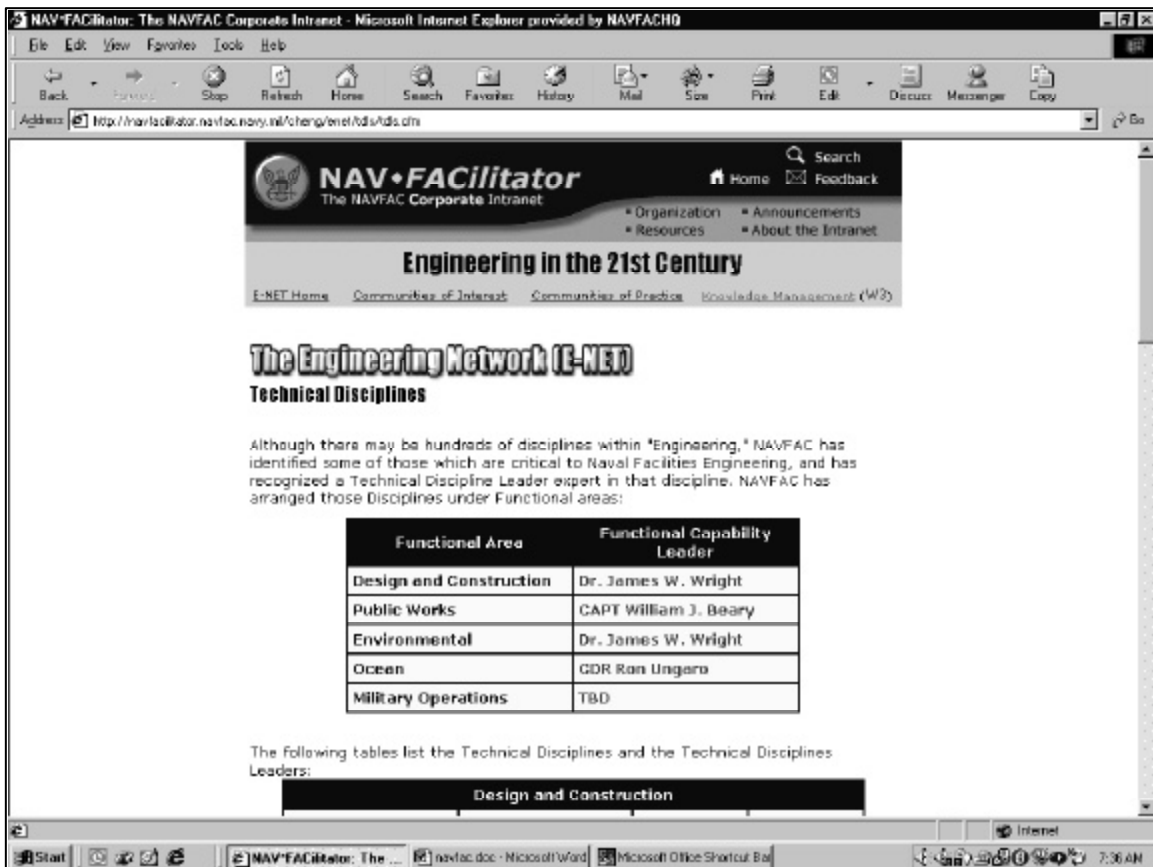
Figure 66. The Communities of Practice Component

Technical Discipline Leaders. The technical discipline leader component (Figure 67) provides a directory of technical discipline experts. Although there are many disciplines within the engineering field, NAVFAC has identified some of which are critical to the Naval Facilities Engineering Command. Each of the identified disciplines has an appointed technical discipline leader. This page provides lists which identify the technical disciplines and allows technical discipline leader access to the collaboration areas.

Figure 67. The Technical Discipline Component

Technical Centers of Expertise. The technical centers of expertise component (Figure

68) also serves a directory function. The technical centers of expertise are subject matter

experts who represent the focal point for NAVFAC core technical expertise. This

component provides in-house expertise in essential areas critical to the mission of

engineering expertise delivery.
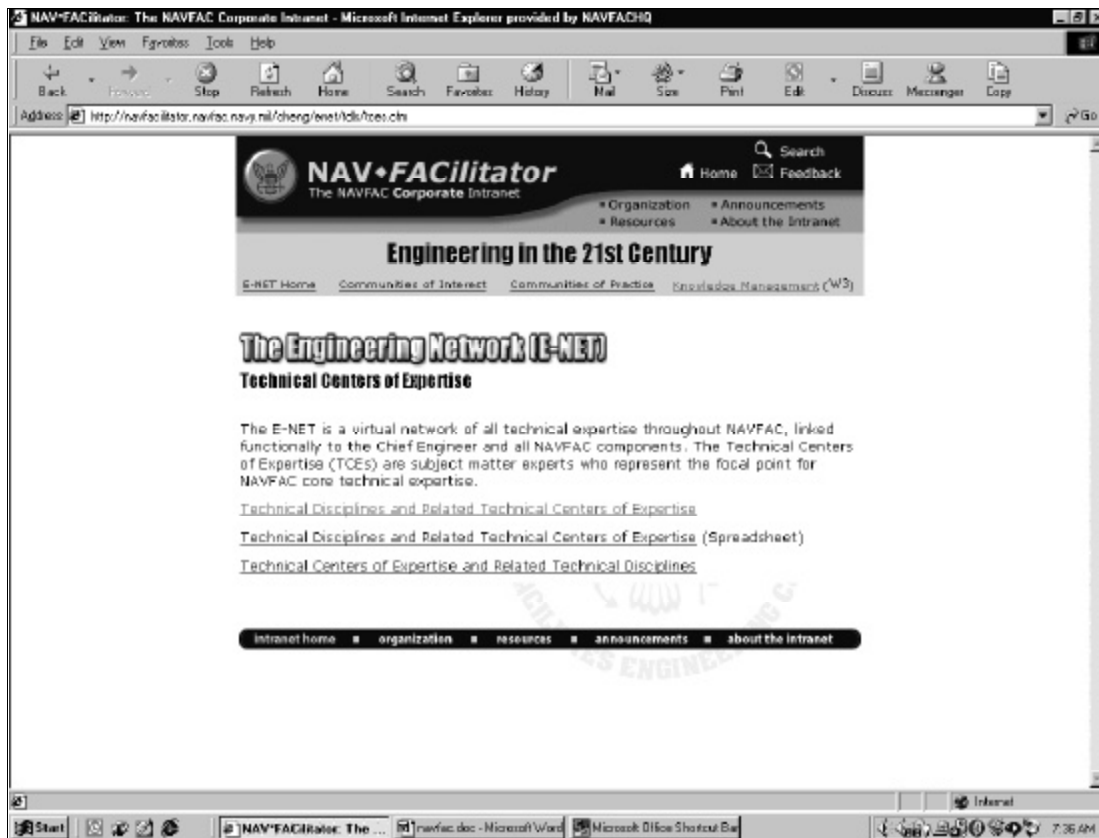
Figure 68. The Technical Centers of Expertise Component

NAVFAC KM Program Team

The dual-pronged nature of the NAVFAC KM effort (i.e., the people-oriented

community management program and the IT-oriented KM system) makes it necessary to

describe the NAVFAC KM program team as two separate entities. Although these

entities each have a different primary focus (either the people system or the IT system), it

should be understood that the programs are very integral to each other and work in

tandem at every opportunity. Many of the individuals key to the engineering community

program effort are also key to the IT effort. The following paragraphs describe the

composition of the core teams that support both facets of the NAVFAC KM program.

Engineering Community Management Program Team

Mentioned previously, the engineering community is divided into 13 technical

disciplines. The Chief Engineer, Mr. Jim Wright, serves as the leader of the entire

engineering network community while Mr. Dennis Scheessele acts as the lead

engineering network (E-NET) community manager. Below these two executive leaders

are the 13 technical discipline leaders who have been identified as leaders in their

particular disciplines. Subject matter experts which represent the focal point for delivery

of specialized NAVFAC expertise further augment these technical design leaders.

Together, these key individuals provide the leadership, direction, and mentoring that is

the cornerstone of the engineering community management program.

E-NET KM System(s) Program Team

The KM technology tools that support the NAVFAC engineering community

management program include the Foundation Knowledge website and the E-NET intranet

system. Mr. Dick Bilden serves as a consultant for CADD/GIS systems. Mr. Clay Dean

provides E-NET system development support. Ms. Bonnie Fairchild serves as

technology support doing all the E-NET website development. These three individuals

are independent contractors. All three are also actively involved with the non-system-

oriented engineering community management program with Mr.Bilden serving in the

capacity of leader for three of CADD/GIS-related communities of practice.

Findings on Influence Factors that Act as Barriers to KM in NAVFAC

Managerial Influence Factors

The purpose of the first research question was to identify managerial influence

factors that act as barriers to organization knowledge management. Using Holsapple and

Joshi's influences framework (2000) as a template for discussion, the following

managerial influence factors are discussed: leadership, coordination, control, and

measurement. The findings are discussed in the general order the questions were posed.

Leadership Factors

Lack of executive leadership commitment. Given the high-profile nature of the

Navy KM program, the lack of strong executive leadership at particular levels with in the

Navy was an unexpected finding. As for the Chief Engineer's Office, in contrast to the

strong executive leadership provided by the Chief Engineer in the early days of the

NAVFAC KM program, the respondents' perceptions about the new Chief Engineer's

commitment to KM were mixed. Some respondents remarked that the new Chief

Engineer, Mr. Jim Wright, had admitted he was "still learning" about KM yet still

appeared reservedly supportive. Other respondents mentioned that the lack of any

serious KM-related activity in the last six months was a strong indicator that maybe he

was not supportive of KM and that the KM program was in danger of folding. Mr.

Wright admitted that he did not see KM as anything new. He stated, "A lot of what is

coming under the heading of knowledge management is essentially the kinds of things

more long-term perspective organizations have always done." Other executive leaders

within NAVFAC were also cited as having a lack of commitment and knowledge about

KM. One key leader admitted that he did not even know about KM until arriving at

CHENG about two years earlier. Other respondents indicated that the design

directors/CIBLs (capital investment business lines) and headquarters staff also needed to

be brought more into the KM fold more so that they could provide better, more informed

support to those individuals and communities under their responsibility.

As for leadership levels above the Chief Engineer's office, the respondents again

indicated a serious lack of leadership support and understanding of KM across the

NAVFAC organization. One respondent stated that it appeared that the NAVFAC

Commander and Vice Commander were well-informed about KM and relatively

supportive, however, the other group captains showed less consistent knowledge and

commitment. Mr. Wright stated that he tended to avoid talking about knowledge

management since individual understanding of the concept (at the executive level) was so

varied. He said he preferred to stick with common words and/or concepts that

demonstrated similar ideas.

Overall, the inconsistent levels of leadership commitment and support for KM

made it hard for the NAVFAC KM effort to flourish. Key leaders and participants in the

KM effort cited education as the challenge ahead.

Lack of reinforcing behaviors. The lack of consistent behaviors (by CHENG and

other NAVFAC leadership) that reinforced the concepts, importance, and implementation

of KM to NAVFAC personnel were of critical concern to those respondents most familiar

and involved with the KM effort. A variety of behaviors were perceived by respondents

as detrimental to the KM effort. First, the Chief Engineer's decision to reduce the scope

of the TDL initiative and to reduce some community management efforts that extended

beyond CHENG's organization boundaries signaled that the KM effort was not a priority

issue with the new leadership. This scaling back of the KM effort reinforced the

lackluster participation of many who had been hesitant to get involved. Secondly, when

leadership was faced with choices between execution-related issues and more long-term

issues such as KM, decisions were always made to support execution. Despite the ardent

support of KM at the highest levels of the Navy leadership, one respondent remarked,

"Nobody cares what the DON CIO says, leaders have to make decisions based on local

conditions."   Third, the Chief Engineer expressed hesitations about "pushing" use of the

E-NET intranet system, not wanting the NAVFAC KM program to become IT-centric.

While not wanting use of the system to become a process where individuals were

compelled to "stop what they were doing in order to submit something to the system," his

lack of emphasis on the technical piece of the KM effort indicated to some that he did not

feel it was important to use. Others remarked that recognition and feedback for putting

information/knowledge into the E-NET was almost non-existent and that there had been

little leadership from headquarters in terms of steering the communities of practice.

Finally, the most revealing comment regarding the lack of reinforcing behaviors from

management involved the belief that committing time to KM meant an adverse impact on

the bottom line. Because a major portion of the Chief Engineer operating budget comes

directly from monies paid for design projects completed, to encourage efforts for

anything else has serious financial impact. To summarize, one respondent stated,

> "When it comes time to free up people…to do [KM], the sub-conscious
>
> and conscious minds conflict because we and all the managers out there
>
> recognize that this is a good program and it's valuable. By the same
>
> token, they have never been beaten on by their commanding officer for not
>
> participating in E-NET. They've been beaten on for failing to execute a
>
> program. And, understand, failing to execute is much like you trying to
>
> write a check for your rent and not putting your paycheck in the bank. I
>
> mean, it is a revolving account and if we don't bring the income in, we
>
> can't spend it on the other end. Unfortunately, our part of the organization
>
> directly represents the people that do the designs that become the contracts
>
> that generate the income. So we're directly—by not completing designs
>
> or not completing them in a timely fashion, influenc[ing] the inflow of
>
> cash on the other end."

The lack of positive KM reinforcing behaviors was a challenge to be dealt with at

NAVFAC. Although no direct interventions against knowledge management were

mentioned by respondents, the actions of leaders and managers were not seen as

encouraging KM.

  Difficult to "sell" KM concepts. Another significant challenge of the CHENG

KM staff in the implementing of KM was the difficulty of selling the concepts to leaders

and customers. Whether discussing the merits of the people-oriented engineering

community management effort or the technical KM systems, the general lack of

knowledge about KM or KM concepts at the executive and other management levels

made it extremely difficult to communicate its benefits and advantages. The lack of

proper language to adequately describe the multi-dimensional aspects of KM made

communication even more difficult. Respondents attributed the difficulties in selling KM

to the fact that KM was still viewed as a fad by some. Others remarked that users would

not support KM if efforts were not producing products useful to them. Finally, the lack

of time to adequately present complicated and unfamiliar KM concepts to leadership

sometimes resulted in what appeared to some to be uninformed and premature decision-

making. When Mr. Dennis Scheessele presented a proposal for a tacit knowledge

harvesting project to the senior leadership, time constraints cut his briefing to the bare

minimum—so much so that the basic concepts of the proposal, in his opinion, could not

be adequately covered, especially given the communication barriers cited above. As a

result, despite the repeated leadership emphasis on the need to capture critical intellectual

capital throughout NAVFAC, the proposal was quickly denied.

Difficulty of "leading" the KM effort. Concerned leaders and managers at many

levels reported difficulties in leading the KM effort. Although most understood the

conceptual importance of KM, the proper steps to implementation were far from clear. In

fact, at the time of the case study, OSD and the Chief Engineer (NAVFAC) office had

just sponsored an executive retreat to discuss knowledge management and if or how they

should use knowledge management in the infrastructure business. Executives from

General Motors, the Air Force, the Army Corps of Engineers, NAVFAC, OSD, and

several engineering companies were in attendance. The hope was that the retreat would allow a discussion of lessons learned and help to solidify a consistent direction for the future.

Another difficulty in leading the KM effort repeatedly mentioned by respondents was the lack of clear direction or consistent efforts to bring together and tighten the people relationships of the engineering communities of practice. There was a strong consensus that the headquarters personnel and technical discipline leaders had a critical role in bringing these communities together, but exactly how to accomplish the task was unknown. One respondent further stated that the lack of strong communities based on personal relationships made it even more difficult to try to inject technology tools, such as E-NET, that was supposed to help the communities grow and communicate.

Finally, those most knowledgeable about KM found it extremely difficult to continue spearheading efforts when the same level of knowledge did not exist at higher leadership levels. It was the impression of some respondents that leadership thought that a knowledge management program was a big project that cost a lot of money. When in fact, at least in the instance of NAVFAC, this was simply not the case. Although the need for continued executive education was an accepted reality, the delays and frustrations associated with it were often discouraging.

Coordination Factors

Difficult to coordinate between "owners" of information/knowledge. In trying to facilitate a knowledge-sharing culture and in trying to populate the E-NET website, those involved in the KM effort found it, in many cases, difficult to get cooperation from the

many owners of information. Many respondents suggested that some of the problems

stemmed from the face-to-face communication nature of the engineering community

while others said it was just hard to convince people of the value of sharing information

as opposed to keeping it close. Ms. Bonnie Fairchild, Technology Support Lead,

experienced the challenges first hand while trying to get TDLs to pass her information for

inclusion on the E-NET website. Some people refused to respond while others stated

they simply did not have time. Mr. Dick Bilden had witnessed similar challenges in

coordinating efforts across the many communities involved with CADD/GIS.

Executive leadership needed to guide KM effort. Although the KM program staff

provided strong leadership for all facets of the KM program, respondents reported that

executive level leadership was necessary to guide policy development and enforce

implementation. For example, current policy failed to address the leadership expectations

of the technical design leaders (TDLs) and other key personnel in the KM effort. A few

TDLs and communities of practice worked well, but many others floundered. Without

the direction and commitment from the top levels of leadership, it was extremely difficult

to coordinate and implement initiatives and information/knowledge-sharing across

organization boundaries.

Difficulty of multiple IT systems. The existence of multiple IT systems was

mentioned as a challenge and frustration by respondents. For users, the existence of

multiple systems that performed the same function or provided duplicate information was

confusing. Additionally, the sheer number of systems in existence made it hard for them

find time to use any. Mr. Scheessele stated, "Right now, we're trying to introduce so

many different systems with ieFacman for acquisition, project management, and

community management, a needs system for community management, and another

system for something else, that people are becoming inundated with new systems to

become involved in. Besides the time factor, the lack of across-the-board coordination on

new systems made duplication a serious consideration. Mr. Jim Wright, Chief Engineer

stated as an example, "…the BMS system is getting ready to be rolled out….It's an ISO-

driven thing. I'm not sure that it isn't a little bit OBE because the whole discussion

started back when IS0 9000/14000 were the latest thing. I'm hoping there's not going to

be any conflict." The existence and nature of multiple IT systems was something that

had to be recognized and accommodated as the E-NET website and resources were being

further developed.

Difficult to establish crossfeed. Whether talking about communication (personal

or virtual) within the NAVFAC engineering community or the engineering community at

large, the lack of adequate crossfeed and crossfeed facilitation mechanisms was

consistently mentioned. This was especially the case where KM was involved. As a

result of the significant personnel cuts to NAVFAC headquarters over the years, it had

become increasingly hard for engineers in specific specialties in dispersed locations to

stay in touch. Funds for annual conferences or get-togethers also disappeared. The need

to re-connect these individuals and engineering communities was one of the primary

selling points of the KM program, but it also played a major role in its slow evolution.

The purpose of the E-NET intranet system was to facilitate communication and

crossfeed, but that had not yet happened to a great extent (except in a few communities

like Interior Design and Pavements). Outside of NAVFAC, Mr. Dick Bilden reported a

similar situation with the CADD/GIS program. Previous to September 11, 2001 it had

been a challenge to bring all the key CADD/GIS communities together. The crossfeed

and communication that did happen, especially regarding KM and the Foundation

Knowledge effort, was due to the personal effort of a few key individuals. Although

September 11th did a great deal to stimulate awareness, concern, and participation in

CADD/GIS issues, establishing formal mechanisms for continued communication and

crossfeed was the challenge ahead.

Control Factors

A variety of control-related factors were identified by the NAVFAC KM staff as

being barriers to their KM effort.

Restrictive impact of external control policies. To ensure lack of conflict on

hardware and software issues and to reduce initial expenditures, the NAVFAC KM staff

chose to comply with the NAVFAC CIO's standards for hardware and software. Since

the E-NET KM system made use of the existing *NAVFACilitator* intranet and technical

infrastructure hardware issues had not been much of a concern. The existing software

standard for the E-NET KM system, however, was a concern. The software standard

given to the CHENG KM technical staff was a product called Allaire Forums. Although

the software worked, a majority of the users as well as the technical developer, Ms.

Bonnie Fairchild, were disappointed in its capabilities and performance. The staff saw the

need to evolve to a more user-friendly software, however the uncertainty surrounding the

local implementation of NMCI had all such decisions on hold. Additionally, the CIO's

policy regarding the look and feel of the E-NET sites was seen as restrictive. The need for continuity was understood, but the policy often frustrated efforts to do something new and/or unique.

From broader perspective, NMCI was becoming a serious issue. Local decision-making in regards to IT issues became more restricted and uncertain. Although the NAVFAC CIO office, as the IT organization, had been dealing with NMCI issues for quite some time, the impact for the CHENG's office was only beginning to be felt. In order to fund NMCI, monies for certain IT functions were being taken away and redirected to the NMCI contract without consideration of existing workloads and performance expectations at the local level. One major question at the time of the case study involved was how Ms. Fairchild's (contract) position and role in technology support of the E-NET would be impacted. Mr. Scheessele was concerned that the costs for NMCI would make it hard to continue to pay for such contractor support. There was also confusion concerning whether E-NET would become a legacy application maintained by the NMCI contractor, EDS.

NMCI was also driving changes to software standards without coordination with individual organizations and without consideration of the overall impact. An example given by Mr. Dean cited the recent mandate by the NMCI staff for the CHENG's Office to survey the TDLs about choosing application software package they wanted to use for E-NET. In Mr. Dean's words, "…they sent out an e-mail to all the technical discipline leaders to…decide out of several thousand applications…which one [to use]---no communities were established, no support mechanisms in place, no meetings about it, just

do it. Which meant for the most part some of them had to do it by themselves." In the long run, this kind of mandated, yet uncoordinated, action threatened to impact the hard-earned progress of the KM program.

  Lack of internal control policies. As the KM program evolved and the use of the E-NET KM system increased, the KM program staff recognized the need for a number of explicit internal controls and enforcement policies. The lack of such policies hindered KM program growth and expanded use of the E-NET KM system.

  Software standards enforcement. The fact that some TDLs in the field were using different collaboration software products made it difficult to promote the use of the E-NET KM system as the single source for all communities of practice. Some TDLs had been involved in using collaboration software in other arenas that they felt were better and more robust. This made them reluctant to use the E-NET technology. In one instance, the KM staff made a personal visit to one TDL to demonstrate the E-NET system. The individual had obviously not even attempted to use the E-NET previously because after the demo he stated, "It's not as bad as I thought it was." In expressing the KM staff's desire to find the right software to support KM and the engineering communities Mr. Scheessele stated, "We want to have a network of engineers define what we want to do with this network of people and then find some software that would support that."

  Content management. Despite the fact that content management was not mentioned explicitly as a problem at NAVFAC, respondents alluded to a number of situations that indicated that it might become a problem. First of all, many respondents

noted that e-mail was still used as a primary method of communication among individuals and the communities. It was noted that there were many important threads of discussion that happened via e-mail that were never caught or transferred in some way to the E-NET KM system repositories. It was also mentioned that as the E-NET system had matured, it had become increasingly difficult to ensure the accuracy and currency of its information/knowledge. Furthermore, it was hard to get some TDLs and other points of contact to contribute information and/or manage their "spaces" on the E-NET system. Respondents recognized, however, that time and manpower constraints drove many of the content management problems. They expressed confidence that responsible individuals throughout NAVFAC would do what was necessary if given the time and proper resources.

Measurement Factors

"Measuring" and/or "valuing" the contribution of KM to the organization was presented by the respondents as a relevant concern. The main issues involved measurements needed for leadership and user support and the lack of appropriate measurements/metrics.

Measurement/value needed to gain leadership/user support. Although there was no evidence that executive leadership had required hard numbers or measurements to justify the KM effort, it was the impression of many of the respondents that without continued proof of value, leadership backing might not be maintained. One respondent stated that "softer and squishier" things like KM were going to suffer substantially during the upcoming budget cuts because they were more long-term and visionary. He felt that

the shorter-term, more tangible things would survive. Mr. Scheessele added that having

metrics available in the past had helped considerably in obtaining funding for projects

and programs. In addition to needing metrics for leadership support, respondents also

mentioned that users also wanted to see the value of KM. Although metrics were

appreciated by users, success stories of how the E-NET KM system had saved time and

effort had been and would probably continue to be the most beneficial proof of value.

Lack of appropriate measures. In trying to provide qualitative measures of their

success both internally and externally, the KM program team constantly struggled with

the lack of appropriate and telling measures. One respondent stated that KM was

particularly hard to sell because it was difficult to demonstrate anything concrete. Ms.

Bonnie Fairchild reported that the E-NET KM system website use statistics were

collected on a monthly basis, though most of the proof of value of the KM effort/system

came from qualitative stories. Mr. Scheessele stated that the challenge ahead was to try

"to develop some metrics along the lines of what it [KM] has accomplished for us, how

much we've saved or produced,…[i.e.] cost avoidance."

Overall, the NAVFAC case study indicates there are a variety of managerial

influence factors that acts as barriers to organization KM. Table 19 summarizes these

influences.

Table 19. Summary of Managerial Influence Findings for NAVFAC.

Influence Factor	NAVFAC Findings
Leadership	• Lack of executive leadership commitment • Lack of reinforcing behaviors • Difficult to "sell" KM concept • Difficult to "lead" KM effort
Coordination	• Difficult to coordinate between owners of information • Executive leadership needed to guide KM effort • Difficulty of multiple IT systems • Difficulty of establishing crossfeed

Control	• Restrictive impact of external control policies
	  • Software standards
	  • Website "look and feel" standards
	  • NMCI policies
	• Lack of internal control policies
	  • Software standards enforcement
	  • Content management

Measurement	• Measurements needed to gain leadership/user support • Lack of appropriate measures

Resource Influence Factors

The purpose of the second research question was to identify resource influence factors that act as barriers to organizational knowledge management. In investigating the question, financial, human, material, and knowledge resources were addressed.

Financial Resources

Lack of adequate funding. The central difficulty in the development, growth, and implementation of the NAVFAC KM effort was a consistent lack of funding. In the past, the lack of funds had restricted the purchase of search engine software for the E-NET website, and funding availability for continued contractor support was in question. Mr. Bob Thompson indicated that the CHENG budget outlook for 2003 was very grim. He explained that the pool of money from which KM efforts could be funded had dwindled

considerably in the past few years. Also, the CHENG office's share of the NMCI "bill" had been much more than expected. Overall, the respondents expressed grave concern about the funding situation, and as a result, the continued viability of the entire KM effort. At the same time, the respondents also indicated that if leadership decided KM was a priority the funds would be found to support it.

Restrictive budgeting environment. The functionally stovepiped nature of funding as well as the different "colors" of money made it very difficult to establish requirements and received funding for KM-related efforts. As Mr. Thompson mentioned, KM activities could only be funded from a particular "pot" of money regardless of whether there was excess money in other "pots." Mr. Wright, the Chief Engineer, expressed similar concerns in discussing the pragmatic considerations of trying to find funds to sponsor conferences and get-togethers for the various communities. The staff knew these problems would not go away anytime soon. In fact, Mr. Dick Bilden saw part of the long term solution as early education. He stated, "You've got to catch these students as pups. And if you don't educate them from the day they walk through the door, they immediately learn all about all the Air Force programs, the Navy programs, [etc.]… But it's all how we are funded. And the stovepipe is set up immediately." Overall, the funding environment not only made it hard for the NAVFAC KM staff to maintain adequate funding for its own internal needs, but also made it difficult to pursue more strategic initiatives to serve the entire engineering community.

Human Resources

Lack of manpower availability. Unlike many of the other cases in this study, the lack of manpower availability was not identified as big a problem within the core KM program staff as it was in the user community. Ms. Fairchild, the E-NET technology lead, did state that she always had more website work to do than could get done, but at the same time indicated that her workload remained manageable. The majority of comments concerned the user population—those that were expected to participate in the headquarters-led KM effort. The respondents expressed a consistent recognition of the overwhelming workload situation and corresponding lack of manpower to accomplish the work in the field units. Although everyone indicated a desire for the KM effort to work and flourish, there was also the understanding that there was little time or manpower to complete tasks above and beyond daily duties required for survival. When asked what he thought was the most significant barrier to implementing KM, Mr. Dennis Scheessele replied, "I guess the one thing I would put up front would be workload. People are already doing so much that they don't have time to do additional things. So we need to find a way to make the E-NET and the knowledge capturing process transparent and part of the things they are already doing." In order to address the workload situation, the Chief Engineer had recently directed a down-scoping of the TDL program in order to remove some of the burden from TDLs in the field. Although this was an important step in trying to make KM/E-NET participation more feasible, the KM staff knew that they would have to continue to be creative if the KM program was going to grow while tightly constrained by static manpower and dwindling funds.

Negative impact of turnover. The impact of turnover was also a significant human resource issue. The concerns centered on both military and civilian personnel turnover with a special emphasis on the broader engineering expertise turnover. The previous command downsizing effort had driven a loss of critical engineering expertise. This event combined with the impending retirements of many civilian personnel made brain drain a critical concern and continued to be a driving motivation for the community management/KM program. Although frequent turnover of military personnel was an accepted part of the military culture, it nevertheless continued to adversely impact the NAVFAC KM efforts. The short-term nature of military assignments drove short-term thinking and decision-making. It also drove the need to re-educate and re-train new leaders and key personnel. The turnover of key civilian personnel and engineers made the accomplishment of even the most basic tasks harder.   All in all, personnel turnover impacted the KM effort by disrupting leadership and key personnel knowledge continuity as well as the capture of intellectual capital throughout the Command.

Lack of knowledge, expertise and skill. The lack of KM knowledge, expertise, and skill as related to the core KM program staff was not mentioned or observed as a negative influence at NAVFAC. The two key individuals, Mr. Dick Bilden and Mr. Clay Dean, who primarily lead the KM effort at CHENG and NAVFAC were extremely knowledgeable and well-versed in the concepts of KM and how it applied to the facilities business. Each of them had been involved with KM, in some way, for quite some time. Given their own level of understanding of KM, their challenge continued to be to pass it on to the people of NAVFAC and CHENG.

Material Resources

     Limited options for KM system hardware/software. As was mentioned previously, voluntary compliance with the NAVFAC CIO's office standards for hardware and software meant that KM program staff had stayed within pre-determined boundaries when conceptualizing and implementing the E-NET KM system application. Because there were no additional monies to purchase different software, the KM program staff accepted the constraints associated with the free software in order to get the program started. As for the hardware/infrastructure, it had for the most part served the needs of the E-NET system and customers. Overall, the KM program staff was glad to have available the infrastructure and tools to get the E-NET KM system started, but they were also very cognizant of its limitations.

     Existing system inadequate. An overwhelming majority of the respondents discussed the inadequacy of the existing E-NET KM system/software. The Chief Engineer stated that although he felt the E-NET system was "positioned to help us," it was not helping users that much just yet. From the E-NET technical developer to other users, many reported being dissatisfied with the capability that E-NET/Allaire Forums currently provided. Their comments covered a range of issues.

     One clear area of focus concerned the capabilities of the software itself. Mr. Dean stated, "…the crisis comes when you buy software and you don't make sure that software really meets the human need of developing and retaining knowledge for re-use. We aren't doing that." He added that the software also did not allow for active collaboration on the web, and Ms. Fairchild stated that it did not include search engine capability

either. A number of others cited the inability to contribute to the system in a natural way. Even the Chief Engineer related that people do not want to do something extra to get knowledge into the system—people should be able to update the tools on the fly as they work. The limitations of the software thwarted many of the efforts to make the E-NET KM system a usable and intuitive technology tool.

In addition to the specific limitations of the E-NET software, some respondents noted that the E-NET system did not mesh with the current ways of doing business or the organization culture. Of primary concern was the fact that the current E-NET system relied much more on an information "pull" mentality as opposed to the "push" mentality that was so ingrained in the current culture. The use of e-mail had conditioned people to wait for information or questions; it was not a habit of most individuals to "keep watch" over E-NET for new information or questions to be submitted. Additionally, use of E-NET had not become critical to the performance of daily processes. One very prominent TDL stated the he did not really use the E-NET very much at all. Finally, another TDL remarked that the E-NET would not be of much use until personal relationships were first developed within the communities. Mr. Joe Gott, the Safety TDL summarized many of the feelings by stating that although the E-NET had potential, it just was not "fully cooked" yet.

Knowledge Resources

Human knowledge resources. Human knowledge resources are described by Holsapple and Joshi as the "raw materials" for knowledge activities (2000, p.241). The

existence of human knowledge resources throughout the NAVFAC was extensive; however, the following difficulties were encountered in trying to implement KM.

Lack of "knowledge about knowledge management." The NAVFAC KM staff battled the "lack of knowledge about knowledge management" on many fronts. This finding was unexpected given the strong and well-regarded Department of the Navy KM program. Many of the respondents spoke of leadership (at various levels) lack of knowledge about KM. Even the Chief Engineer stated that KM was not often a topic of conversation at the higher levels of leadership. He stated about his own knowledge of KM, "Knowledge management to me is just kind of an umbrella term that tries to cobble a number of things together that looked at together tend to provide a little more synergistic benefit than just having human resources look at demographics, CIOs look at portal availability, and engineers with guide specs… ." Other respondents said they had never heard about KM before they came to NAVFAC. Mr. Scheessele related that he did not feel the information about KM had made it to personnel in the lower levels of the organization. Overall, there was a pervasive lack of knowledge about KM in NAVFAC which continued to negatively impact the KM program effort.

Lack of tacit knowledge capture. Despite the recognition of the importance of tacit knowledge, very little was currently being captured. Tacit knowledge contribution to the various E-Net repositories was certainly encouraged, but it had not happened to a large extent. Mr. Dean's recent proposal for a tacit knowledge harvesting project had been flatly rejected. In the absence of any formal processes or mechanisms to capture tacit knowledge, the focus of the KM effort remained on connecting people within the

engineering communities. It was hoped that these relationships would facilitate equally

valuable tacit knowledge sharing.

Lack of knowledge about future KM strategy. None of the respondents

interviewed expressed any strong ideas about the future of the NAVFAC KM effort.

They did express a strong belief in the merits of KM, but did not possess a solid vision

about how the program would evolve beyond its current stage. The uncertainty

associated with new CHENG leadership, NMCI, and the budgetary situation appeared to

have "stalled" progress, at least for the moment. Although the pause was thought by

some to be the result of the new leadership learning about KM and sorting out priorities,

others felt the slow down was a signal that the KM program was falling apart.

Incompatible/Inaccessible knowledge/info stores. Due to the fact that the E-NET

system was relatively young, the incompatibility and/or inaccessibility of existing

information and knowledge stores had not yet become a big concern. Ms. Fairchild did

mention her use of Cold Fusion software to connect existing databases to the active

server pages of E-NET, but data accessibility or incompatibility issues were not identified

as a problem. Mr. Dick Bilden did, however, state that data standardization issues had

been and still were a big concern in the CADD/GIS community. He and some others had

put in a lot of effort in getting the CADD/GIS Technology Center to understand that data

and communication standards were important if people in the field at different locations

were going to be able to communicate with each other.

Lack of knowledge about KM-supportive organizational culture. The knowledge

of organization culture is a human knowledge resource that significantly impacts the

implementation of KM. After funding, organization culture was cited as the next most

significant barrier to implementing KM in NAVFAC. Many respondents cited the nature

of the engineering culture as unique and possibly more adverse than some to the key

tenants of KM. The need for face-to-face interaction between the engineers and within

the communities was noted as critical in making any KM initiatives work. Many felt that

limited E-NET KM system participation stemmed from the personal communities not

being able to "gel" first before the virtual communities were developed. Also, many

community members did not want to share information or simply did not have the time.

Other cultural habits that did not support KM included the regular, arbitrary clean out of

the CHENG library and the traditional files dump of individuals leaving the organization.

Although not critical in themselves, these kinds of habits were ingrained in the culture

and were adverse to all the concepts of KM. They perpetuated the loss of corporate

knowledge and continued to drive the need to re-create the wheel. The general lack of a

KM-supportive culture was a constant challenge for the KM program team and other key

individuals attempting to bring KM concepts to the engineering community. Although it

was frustrating at times, many of the respondents expressed an understanding that the

evolution to KM would be a long and slow process.

Overall, the NAVFAC KM case study indicates there are a variety of resource

influence factors that act as barriers to organization KM. Table 20 summarizes these

influences.

Table 20. Summary of Resource Influence Findings for MARCORSYSCOM

Influence Factor	NAVFAC HQ Findings
Financial	• Lack of adequate funding • Restrictive budgeting environment
Human	• Lack of manpower availability • Negative impact of personnel turnover • Lack of KM knowledge, expertise, and skill
Material	• Limited options for KM system hardware/software • Existing systems inadequate
Knowledge	• Lack of "knowledge about knowledge management" • Lack of tacit knowledge capture • Lack of knowledge of future KM strategy • Incompatible knowledge/information stores • Lack of knowledge about KM-supportive culture

Environmental Influence factors

The purpose of the environmental influence factor category according to

Holsapple and Joshi (2000) is to capture and separate those influences that are external to

the organization being examined. For the purposes of this research, the definition of

"external" was defined as outside the confines of the immediate KM program

organization. In the case of a large military organization such as the Navy/Marine Corps,

influences at the major command levels and higher can be considered external to

organizations such as NAVFAC. The influences to be discussed were considered

external to NAVFAC (and the KM effort) but all such influences weren't necessarily

external to the Navy as a whole.

GEPSE Climate

The GEPSE (governmental, economic, political, social, educational) climate

ultimately impacts all aspects of the military organization. The influences of this climate

are passed on to the military through political channels as well through military leadership and the individuals who serve. Recognition of these influences, however, at the lower levels of the organization hierarchy is almost non-existent. In the case of the NAVFAC respondents, the influences of the GEPSE climate were regarded as much more indirect than direct.

Negative impact of politics. Of the respondents interviewed, few spoke directly about the influences of politics at the local or higher level. Some comments, however, implied that certain elements of politics had a negative effect on KM. The fact the some of the NAVFAC executive leadership were not particularly fond of KM, made it a taboo topic in various forums. In order to stay politically correct, KM was simply not discussed (in the terms of KM) or not at all. Also, it was mentioned that it was difficult to pursue initiatives that cut across organization boundaries because of the conflict it caused with local leadership and ways of doing business. Respondents repeatedly stressed the need to bring critical leaders across the NAVFAC organization into the fold because, without their support it would continue to be extremely difficult to build cohesive communities that cut laterally across existing organization boundaries.

Increased security climate. The events of September 11, 2001 only served to heighten awareness in an already vigilant security climate. Due to strict network security requirements, the KM staff had on occasion had to work E-NET intranet access issues for customers who were located outside the firewall. Ms. Bonnie Fairchild also stated that the information/knowledge contained on the KM systems had faced increased scrutiny, as some portions of the systems were available for public access. Although the additional

security precautions were seen as a necessary evil, they were just another task to be accomplished.

Negative impact of outsourcing. Although not mentioned directly in relation to the KM program, the negative impact of outsourcing was seen by some as a critical issue across the board. The push to outsource all non-mission essential functions was seen to be endangering critical internal competencies and the overall organization knowledge base. The eventual impact to the E-NET and KM program was that the tight network of engineers and the competencies that they were organized around could eventually break down and cease to exist.

Negative images of KM. The NAVFAC KM team constantly battled the image of the KM effort as being a fad, an extra project or something above and beyond regular duties. These negative images were understandable given the sometimes bad press KM gets in the media and the ramp-up work that was necessary to get the effort going and the E-NET KM system built. On this topic, the Chief Engineer remarked, "…it's regrettable—and maybe it's just the nature of the consulting world that we live in, that knowledge management has taken on some of the overtones of being something that one can overdo, like total quality management, ISO types of things and six sigma…" Given KM's reputation with many, the KM program staff knew that changing user and leadership perceptions about KM was a challenge that would continue for quite some time.

Negative impact of "stovepiped" culture. The functionally stovepiped nature of the Navy and the services in general was seen as an impediment to KM efforts. From

funding to programmatic and cultural issues the functional stovepipes were seen as

thwarting KM efforts, especially those that required crossing organization boundaries.

Because these stovepipes were so institutionalized, it was recognized that creative

approaches would be needed if KM was to flourish.

Technology

No negative influences of external technology were mentioned by any of the

respondents. In fact, because of the compliance with existing hardware and software

standards and the lack of funding for any additional purchases, the focus appeared to be

directed away from such issues for the moment. It was mentioned, however, that

customers expected more from the E-NET KM system than it was currently offering.

Their exposure to increasingly advanced technology in other forums was offered as one

reason for increased expectations.

Competition/Fashion

Negative impact of private sector trends. The Chief Engineer, Mr. Jim Wright,

made an interesting observation with regard to the military's reaction to private sector

trends. He stated, "…quite often in the government and DoD we find ourselves a little bit

behind. Something takes off and becomes a hot item in some more forward-looking

companies. And then as they are starting to down cycle a little bit the government piles

on without really tracking and seeing what's going on and learning from those things that

were a success and deemed to be applicable." This was an interesting point and a key

reason his approach to KM had been very contemplated and deliberate.

Limited KM crossfeed between services. Competition between services in the area of KM was not recognized as a negative influence at NAVFAC. Negative feedback was received regarding the lack of crossfeed between the services. Mr. Dick Bilden emphasized this situation especially in regards to the CADD/GIS effort. Although the recent leadership retreat hosted by the CHENG office was an active attempt to establish crossfeed amongst service and private sector organizations in the infrastructure business, the KM program staff understood that formal mechanisms for continuing communication needed to be put in place.

Time

Lack of time. The need to make better and faster decisions and the need to complete tasks in a more timely and efficient manner have been time influences that have driven the NAVFAC KM effort. All the respondents stated in one manner or another that the lack of time has negatively impacted their ability to implement KM. Specifically, the lack of time has acted as a barrier in that individuals (who are the essence of the KM program) simply do not have time to learn or participate, and do not perceive that it is important enough to leadership for them to shift any of their priorities to do so. The shortage of manpower has also contributed to the lack of time for those left to handle the ever-increasing workload. The challenge ahead for the KM staff was to convince the leadership and users that time invested in KM now would be time saved in the future.

The NAVFAC case study indicates there are a variety of environmental influence factors that acts as barriers to organization KM. Table 21 summarizes these influences.

Table 21. Summary of Environmental Influence Findings for NAVFAC

Influence Factor	NAVFAC Findings
GEPSE Climate	• Negative impact of politics • Increased security climate • Negative impact of outsourcing • Negative images of KM • Negative impact of stovepiped culture
Technology	• Increasing expectations of customers
Competition/Fashion	• Negative impact of private sector trends • Limited crossfeed between services
Time	• Lack of time

Summary of Influence Factors for NAVFAC

In summary, this chapter has presented the findings from the case study of the Naval Facilities Command KM effort. Using Holsapple and Joshi's (2000) framework as a guide, the three classes of influence factors—managerial, resource, and environmental—have been examined. The findings suggest that a variety of influence factors act as barriers to implementing and executing organization knowledge management. Some findings are particularly unique to the military. These findings are compared to five additional case studies.

CHAPTER NINE—CENTER FOR ARMY LESSONS LEARNED[18]

Organization and KM Program Profile

Organization Structure and Mission

The U.S. Army Training and Doctrine Command (TRADOC) is one of the

Army's fifteen major commands (Figure 69). It is home to many subordinate

organizations including the Combined Arms Center (CAC) located at Ft. Leavenworth,

Kansas. The CAC is commanded by a lieutenant general who also serves as the

TRADOC Deputy Commanding General for Combined Arms. One of the major
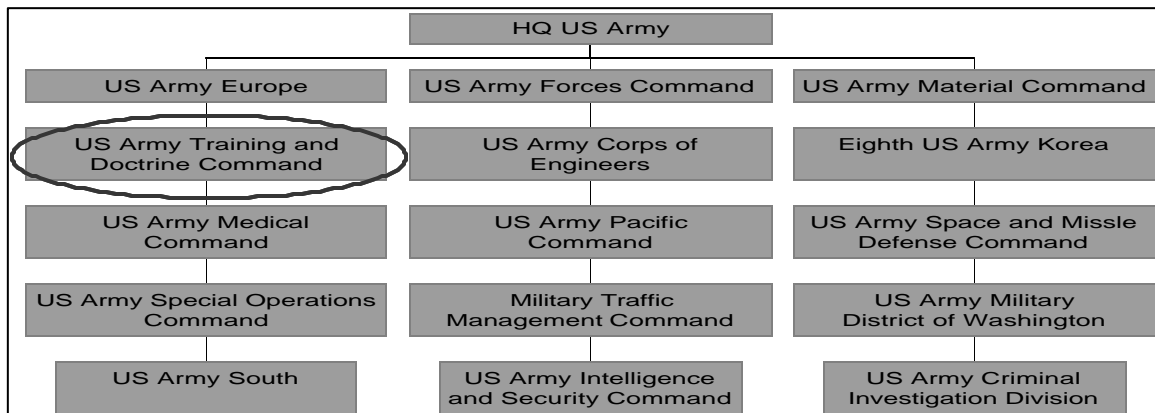
Figure 69. U.S. Army Organization Chart

activities of the CAC is the TRADOC Deputy Chief of Staff for Training-West

organization (DCST-W). DCST-W is responsible for combined arms training at the

combat training centers and TRADOC supporting organizations and provides oversight to

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[18] Information for this case, except where stated otherwise, is based on interviews conducted April 3-5, 2002, at CALL.

multiple organizations including the Center for Army Lessons Learned (CALL). As

such, the CALL reports directly to DCST-W (see Figure 70).
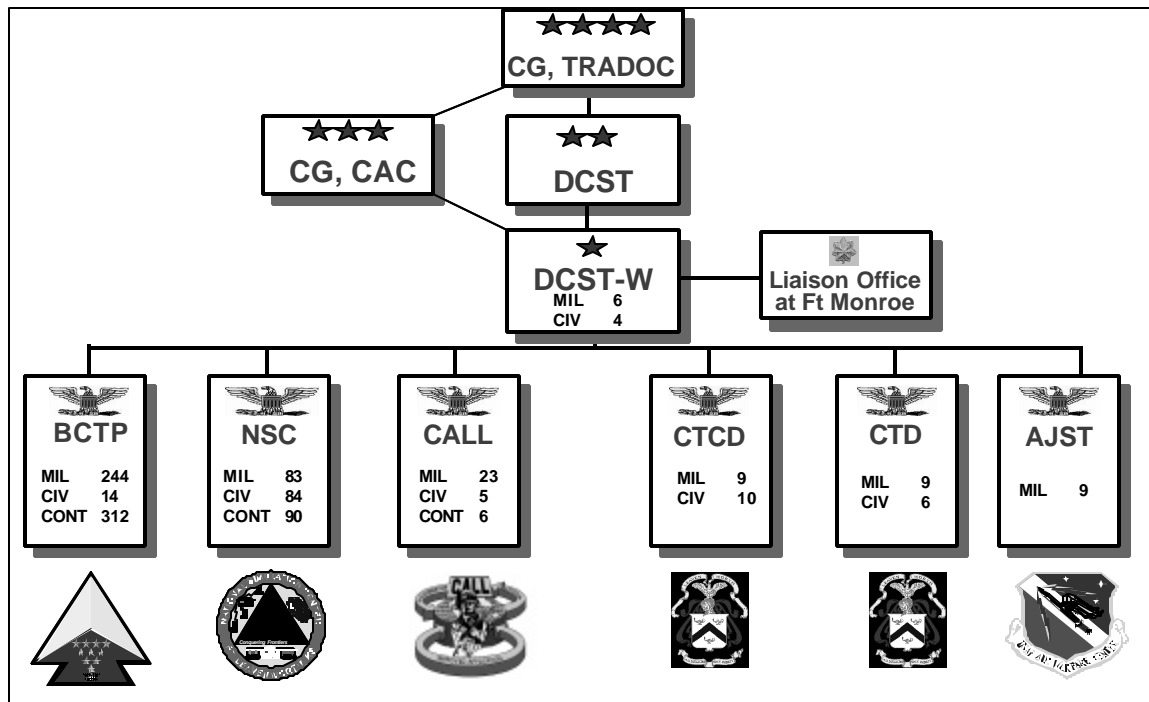
Figure 70. Organization of U.S. Army Training and Doctrine Command

According to the DCST-W homepage (http://leav-

www.army.mil/cac/missionstatements/dcst-w.htm, retrieved June 20, 2002), the mission of the

CALL is to collect and analyze data from a variety of current and historical sources in

order to provide timely and relevant lessons learned, tactics, techniques, and procedures,

research material and foreign assessments to Army units around the world. CALL also

deploys Combined Arms Assessment Teams (CAATs) to real-world contingency and

major Army training events to observe operations and to collect operational documents.

CAAT members collaborate with the Center for Army Lessons Learned analysts to

develop lessons based on the first-hand experiences of soldiers and leaders in the field.

These lessons are disseminated across the Army in the form of articles, newsletters, and bulletins to improve individual and collective performance, shape doctrine, and share information. CALL is also leading the way in digital information technologies and electronic data and records management as TRADOC's Project Office for the University After Next, a knowledge system designed to support the knowledge dominance requirements of the Army After Next.

CALL-- KM Program "Home"

CALL is unique in the spectrum of cases investigated in this research in that the entire organization is dedicated to supporting KM objectives. An entity unto itself, the CALL has a primarily external focus and is designed to provide information and knowledge support for individuals and organizations across the Army. The CALL mission and services have evolved over time. Although its objectives and principles of operation have always been closely related to KM concepts, only recently has the explicit relationship with KM been established. With the KM link established, CALL continues to forge ahead not only as a thought leader in the Army, but also as a developer of cutting-edge processes and systems to benefit the tactical warfighter.

History

Since its inception in 1985, the focus of CALL has always been to provide practical support to leaders, trainers, and soldiers. Over the years, it has repeatedly sent collection teams with Army units to the training centers and contingency operations around the globe. Its written reports and observations have served not only commanders,

training officers, and service schools, but also have augmented doctrinal publications and tactics, techniques, and procedures taught in the field (Holder & Fitzgerald, 1997).

In the mid-1980s, Army leadership realized it needed a way to capture lessons learned that came as a result of the exercises held at the National Training Center. CALL filled this need by developing publications focused on successful tactics, techniques, and procedures. Over time, CALL's mission expanded to collecting and distributing insights on all Army exercises. After adding fast-reaction collection teams that deployed with fighting forces to the CALL staff, it was decided that an electronic archiving and dissemination capability was needed to bring the information to Army leader and soldier desktops (Holder & Fitzgerald, 1997).

"During his tenure as Army Chief of Staff, General Gordon R. Sullivan developed the concept of an Army Knowledge Network (AKN), a system of linked and cross-referenced databases constituting a complete collection of all military, political, social, and economic information pertinent to operations" (Holder & Fitzgerald, 1997, para. 9). In 1992, this idea came to fruition with the electronic archiving of Gulf War documents. From 1991-1993, a CAC planning group consisting of personnel from the CAC History Office, CALL, the Defense Printing Service, and Directorate of Information Management, and the Combined Arms Research Library addressed the flood of Gulf War data with a concept for an online Army "archives without walls" (Holder & Fitzgerald, 1997, para. 9). From 1992-1996, the responsibility for archiving additional contingencies and exercises rapidly grew as did the roles and missions of the CAC History office. As a result, the CAC History office was re-designated as the AKN Directorate.

Despite the trials and tribulations of conceptualizing a process for electronic archiving and dealing with "truckloads" of paper documents from actions such as the Gulf War, Somalia, and Haiti, the CAC history/AKN Directorate office accomplished many firsts and became a recognized leader in the electronic archiving business. The following paragraph describes the extent of CALL's accomplishments.

"By 1996, the AKN automated archival database had grown to 1.5 million pages and had earned national recognition as a pioneering online information system, winning both Vice President Al Gore's *Hammer Award* and an honorable mention *Smithsonian-Computer World Award*. The *Hammer Award* recognized the CAC automated archives team for its support of President Bill Clinton's National Performance Review principles of customer support, elimination of bureaucratic red tape and the empowerment of employees. The *Smithsonian-Computer World Award* recognized AKN's visionary use of information technology and included placement of the archival database into the Smithsonian Institution National Museum of American History Permanent Research Collection on the history of information." (Holder and Fitzgerald, 1997, para. 11)

In March 1996, CAC combined AKN and CALL together. Uniting these two entities was a logical move given that their missions and responsibilities had become so complimentary. In the words of Holder and Fitzgerald (1997),

> "CALL had a decade-long tradition of excellence in analyzing Army contingency and collective training operations and providing relevant lessons learned feedback to field commanders, staffs, and soldiers. AKN had built a national reputation in the electronic archiving and dissemination of archival documents and secondary literature.…AKN information systems, when coupled with emerging CALL WWW expertise, for example, solved longstanding CALL problems in disseminating vital information throughout the Army. Association with CALL, however, gave AKN capabilities a critical mission focus on commanders' critical information requirements that would simultaneously serve educational, training, doctrinal, and other Army information needs."

Although CALL's basic mission has remained relatively stable over the past years, there has been a simultaneous evolution of thought and focus on the concepts of knowledge management. Having begun his association with CALL as the assistant CAC command historian, Dr. Rick Morris has been a thought leader and driver of innovation throughout CALL's evolution. Now, as the Deputy Director of CALL[19], Dr. Morris is leading CALL in a full-blown effort to address its mission from a knowledge

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[19] At the time of the case study, Dr. Morris had been selected for a position in the ARMY CIO's office in Washington, D.C. to work knowledge management proponency issues.

management perspective. Dr. Morris described his role and the evolution to knowledge management as follows:

"When I took over as the command historian, I was responsible for supporting…education and leader development in the Command and General Staff College, the combined arms training function, and the combined arms combat development function. I also had secondary responsibility to support and provide historical support to those who were working the operations research and systems analysis that helped to make a sense of reality for those who were changing force structures and material requirements, those who were changing training systems, or those who were analyzing problems in leader development.…it also got me in the business of being concerned about the behavioral and cognitive sciences that had to be brought to bear especially in the leadership development realm.…And then when I began to get in the business of technology and into proto-knowledge management, I did it in support of CALL. And so…what began as automated historical archiving, then expanded in scope to a full explicit knowledge management approach."

Dr. Morris further stated that over time he and his staff saw the requirements of their customers evolving to another level. He stated,

"And while there was a need for data and information, especially in the research and development community.…those on the 'sharp end'…wanted finished products that they could use immediately. And so we began to

think through even then. We began to think through even then how to go

beyond the written record…how to tap into "head knowledge."

He continued,

"And that intersected with the taking over of the Combined Arms Center

by a truly brilliant Army general named Montgomery Meigs.…He

directed us to take the implications of what we were doing and develop a

concept called University After Next. The University After Next was

designed to support knowledge feed in the emerging, future force….And

so we had to think through then how to take what we had already begun to

build and to get the right knowledge to those who were either at the sharp

end on the ground in a military operation or those who were planning that

operation or preparing their forces.…It took us two years of struggle

intersecting with the emerging experience in the corporate sector and the

emerging literature on knowledge management to understand that the best

way ahead involved a sort of third-generation CALL system that would

bring to bear the best insights from those wrestling with the learning

organization, those wrestling with how to do knowledge management, and

above all those wrestling with how to bring to bear the knowledge that

was in peoples' heads."

Although the conceptual role of knowledge management in the mission of CALL

is now much clearer, the CALL staff continues to struggle to make it happen. The recent

emphasis on knowledge management from the highest levels of Army leadership is

encouraging, but the staff admits there is much work yet to be done. The continuous

ground-breaking application of technology combined with creative, out-of-the-box

thinking have been the hallmarks of CALL both past and present.

CALL Vision

To be clear, although the concepts of knowledge management are integral to the

mission of CALL, the singular mission of CALL is not knowledge management. The

basic mission of CALL continues to be to provide practical support to leaders, trainers,

and soldiers through the collection, publication, and dissemination of lessons learned and

other important information and knowledge. The CALL vision of the future, however,

sees this basic mission expanding once again to include the development of tactical

knowledge systems that will change the way the Army thinks about, works with, and uses

knowledge and information. According to a recent Federation of Government

Information Processing Councils' article, this new program, called the Warrior

Knowledge Network, is organized into two thrusts. The article states,

> "The first is focused on information and making our products work better
>
> in meeting the needs of the soldiers. This involves exploiting new
>
> technologies, new approaches to digital production, and new ways of
>
> packaging information to support decision making. The second thrust is
>
> focused on knowledge and finding the best methods to tap into the
>
> experience base of our soldiers and leaders. This involves developing
>
> peer-to-peer networks, subject matter expert networks, and mentoring
>
> networks across the Army." (2002, para. 1)

Recalling Dr. Morris' statement, "I see the evolution of a third-generation CALL system," it appears that the third-generation system is taking form as part of the Warrior Knowledge Network initiative.

CALL "System"

The CALL "System", or more appropriately, website, has evolved continuously since 1996. Unlike the other cases investigated in this research, the CALL website was not created specifically in support of knowledge management. Although it currently supports a variety of information and knowledge needs, it serves primarily as a repository, portal, and mechanism to request assistance in locating information/knowledge. The soon-to-be released Warrior Knowledge Network will act as a compliment to this system by facilitating the communication and collaboration aspect of knowledge sharing.

The technical infrastructure of the CALL system includes the use of redundant servers with worldwide connectivity provided via an Internet backbone. Databases of archived information provide the core of the system while links to other resources are numerous. The website is hosted using Microsoft Windows 2000 Server using Internet Information Server. Several development packages are used to include Windows Notebook, Adobe GoLive, and Arachnophilia 4.0 and Hot Dog HTML editors. With the exception of the CALL database and the Military Domain search engine, everything is composed using static HTML coding.

CALL Website Components

CALL uses a central website (http://call.army.mil) as its portal. The homepage

(Figure 71) acts as a hub for access to a variety of components (Figure 72) that include:

search engines, CALL products, CALL databases, training and doctrine resources,

Operation resources, school links, CALL dictionary and thesaurus, and a "contact CALL"

mechanism. Each of the components serves a different purpose across the spectrum of

the website. The following provides a brief description of each as currently described on

the CALL website itself.
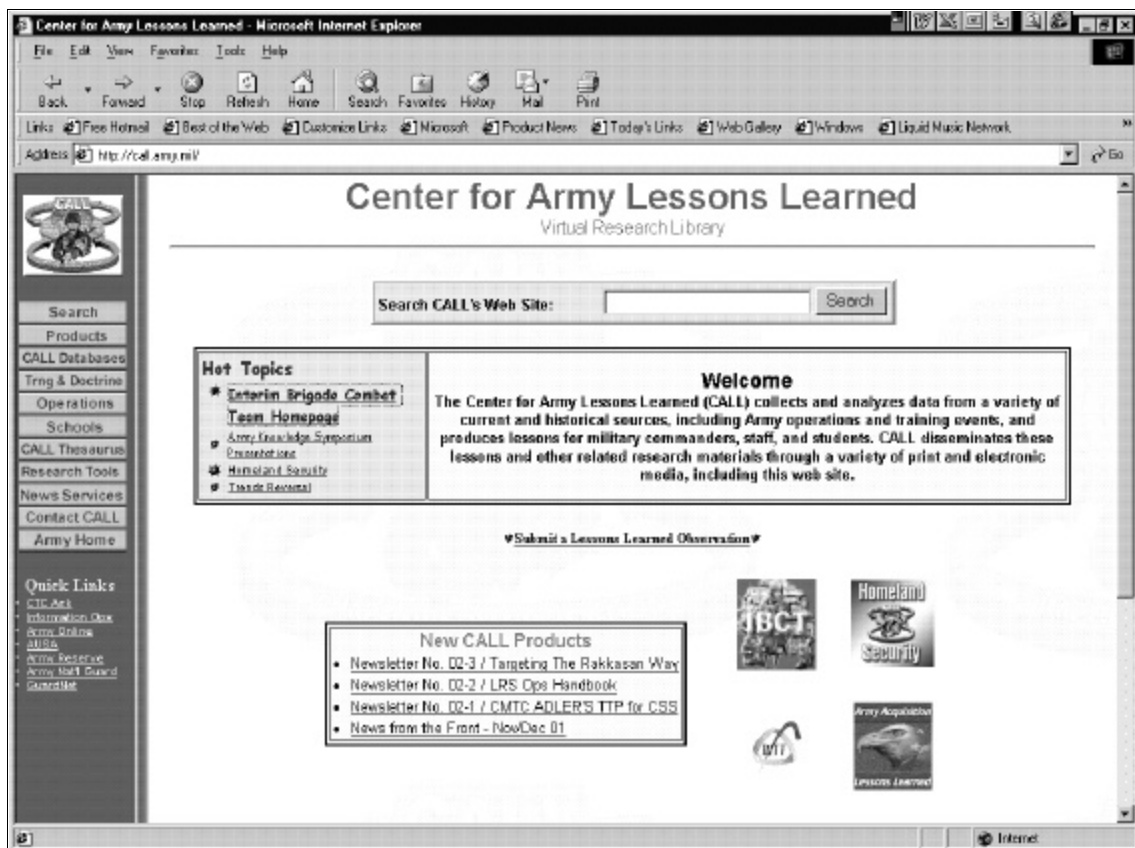
Figure 71. CALL Website Homepage
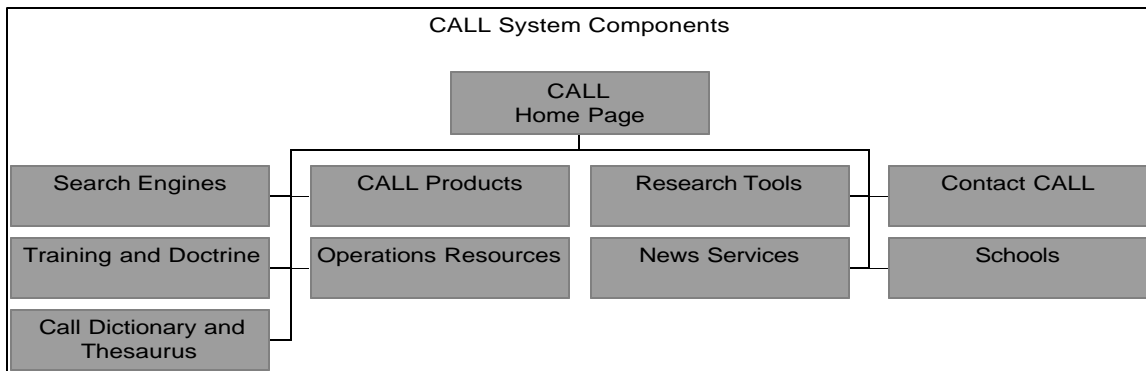
Figure 72. CALL System Components

Search Engines

    The search engines component (Figure 73) of the CALL website provides access

to multiple search engines. Depending on users' needs one or more of the search engines

may be more appropriate. The provision of this wide selection of search engines

increases the chances that users will find what they are searching for.
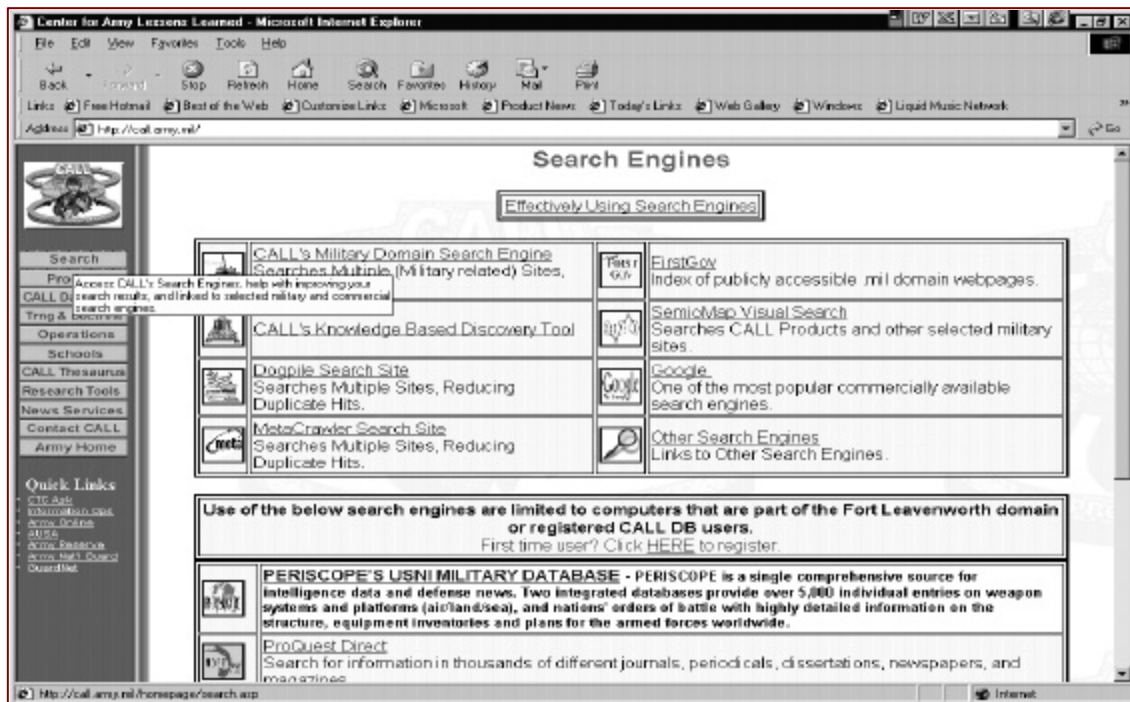
Figure 73. Search Engine Component

CALL Products

The CALL products component (Figure 74) provides access to all of CALL's

products including newsletters, News from the Front, CTC Bulletins and Trend

publications, CTC training videos, training vignettes, special studies, and handbooks.
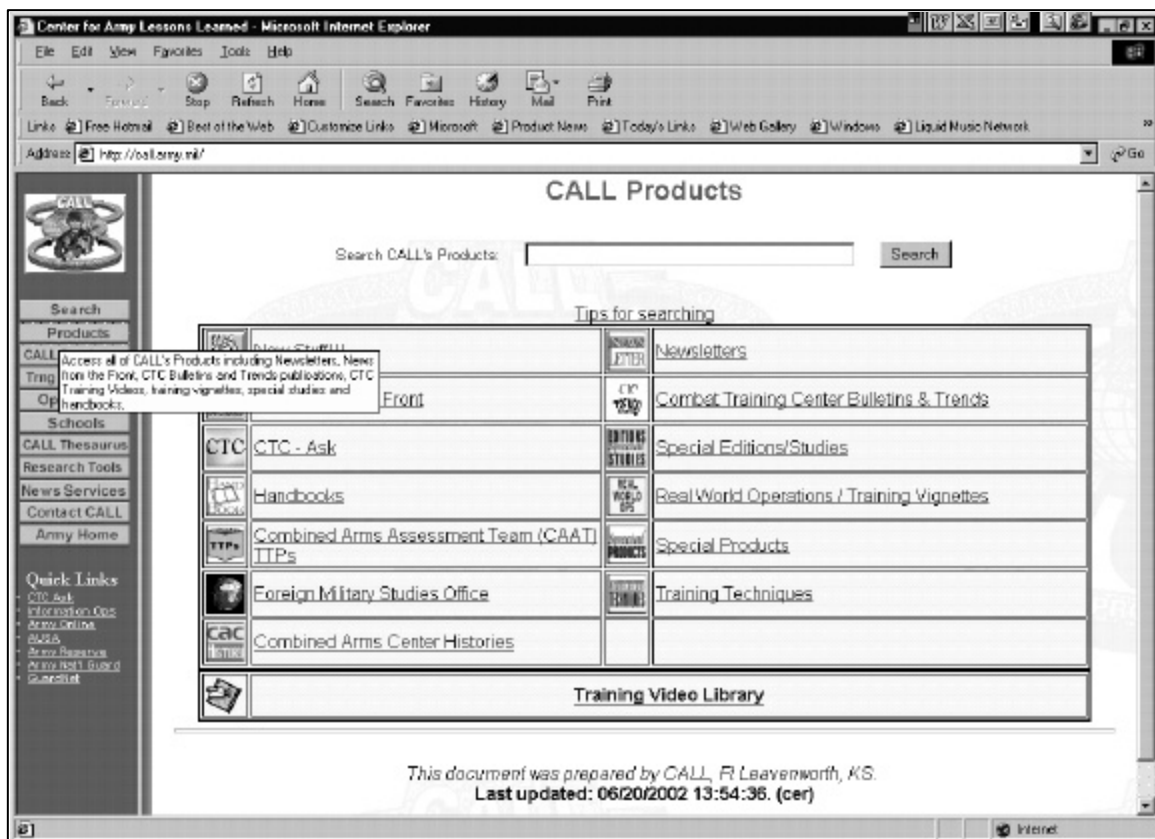
Figure 74. CALL Products Component

CALL Libraries and Databases

The CALL Libraries and Databases component (Figure 75) provides access to CALL's public and restricted databases, which include digital books, periodicals, and archives, the ABCA Coalition Lessons Learned database, and the CALL Collection and Observation Management System.
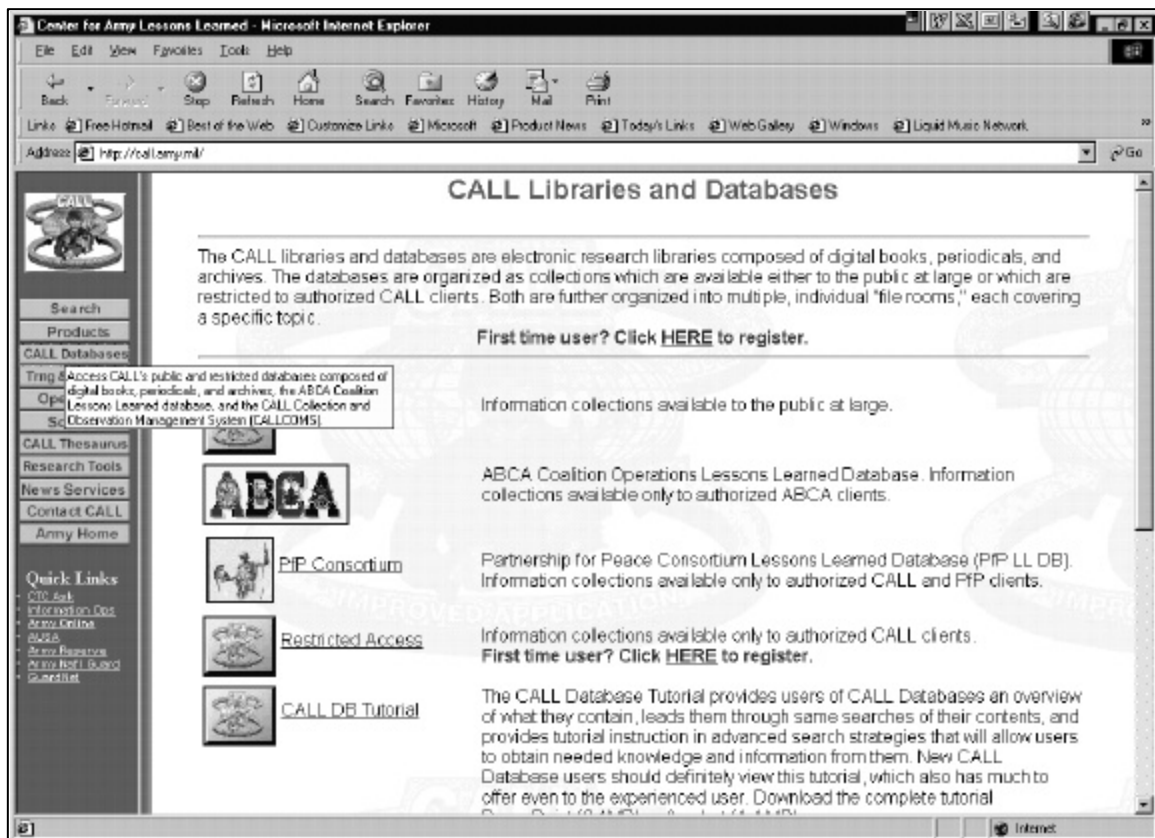
Figure 75. CALL Libraries and Databases Component

Training and Doctrine

The Training and Doctrine component (Figure 76) provides links to resources that provides information on Joint, Army, Navy, Marine Corps, and Air Force training and doctrine.
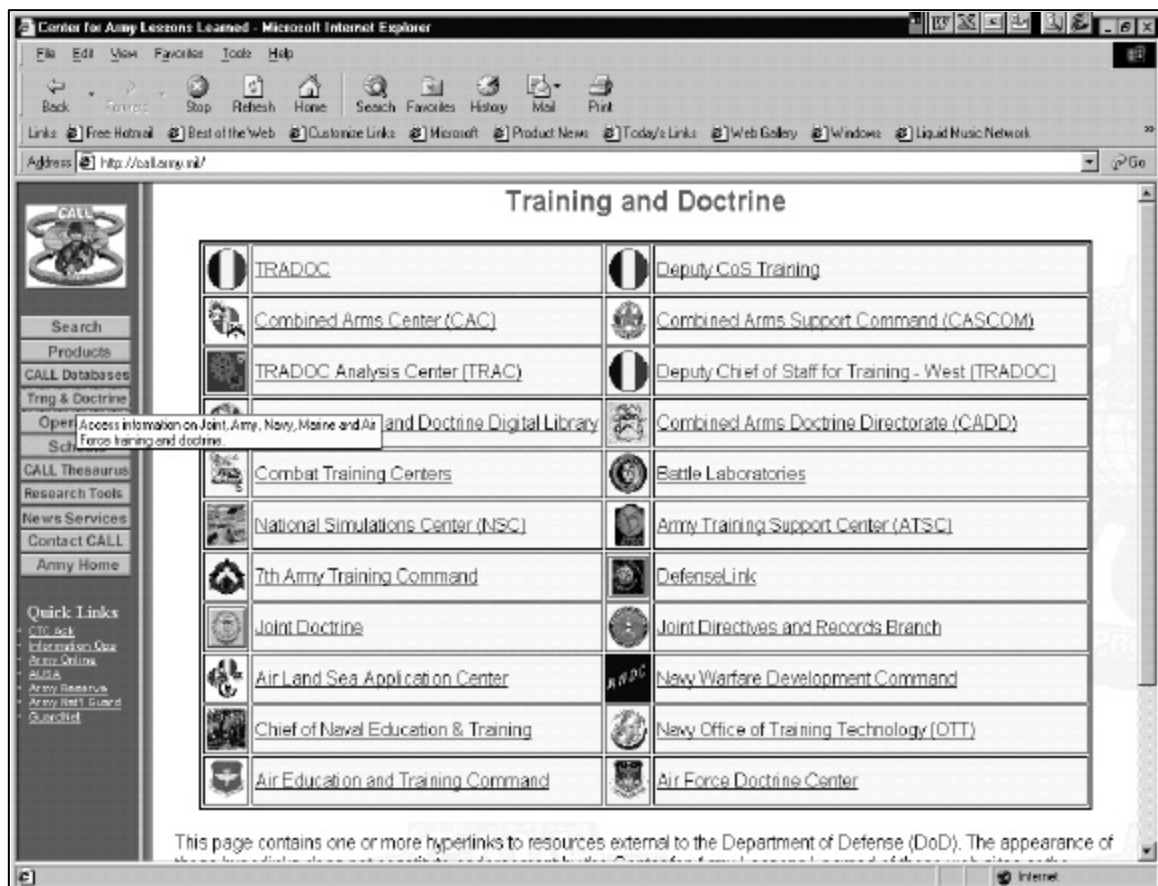
Figure 76. Training and Doctrine Component

Operations Resources

The Operations Resources component (Figure 77) provides access to operational information from a variety of sources to include the UN, NATO, the State Department, and National Imagery and Mapping Agency. It also provides links to logistics, intelligence, humanitarian assistance, information operations, and more.
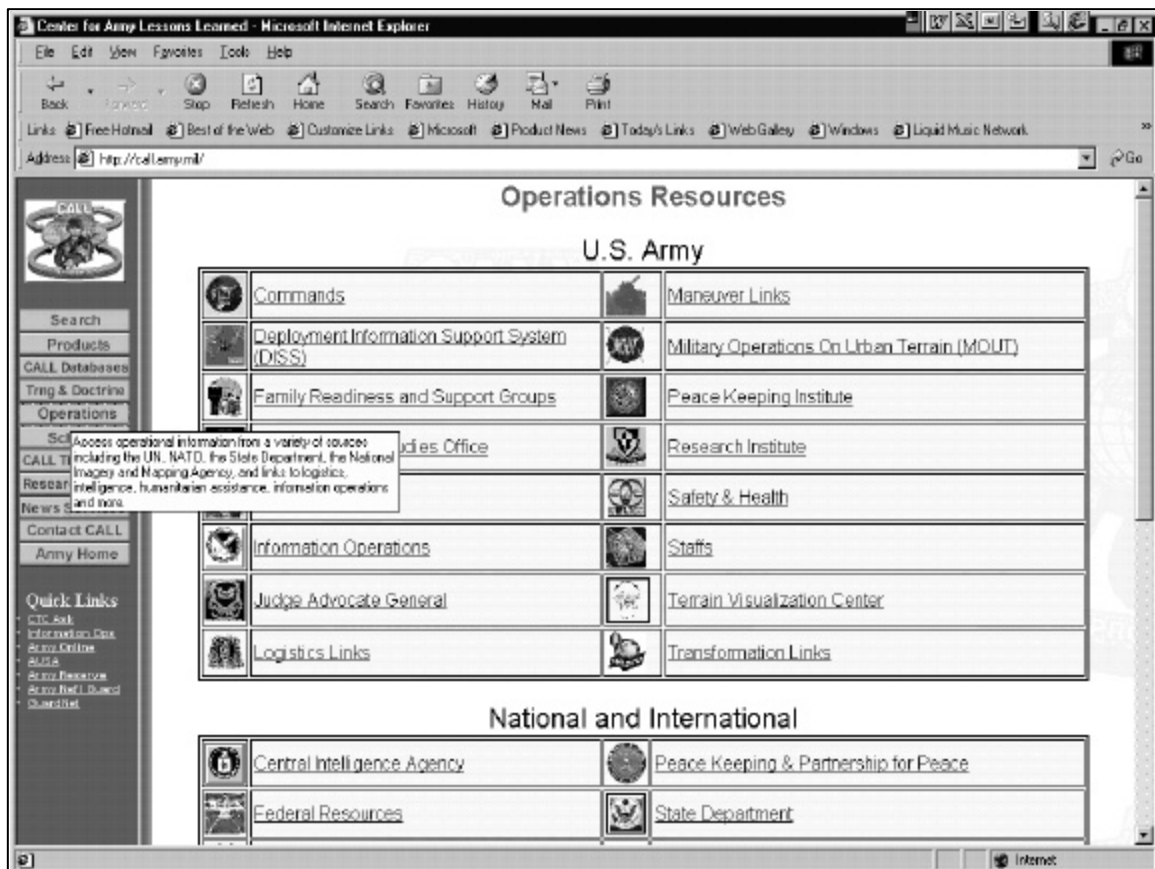
Figure 77. Operations Resources Component

Schools

The Schools component (Figure 78) provides access to information housed at

national, joint, service-specific schools, and service academies.
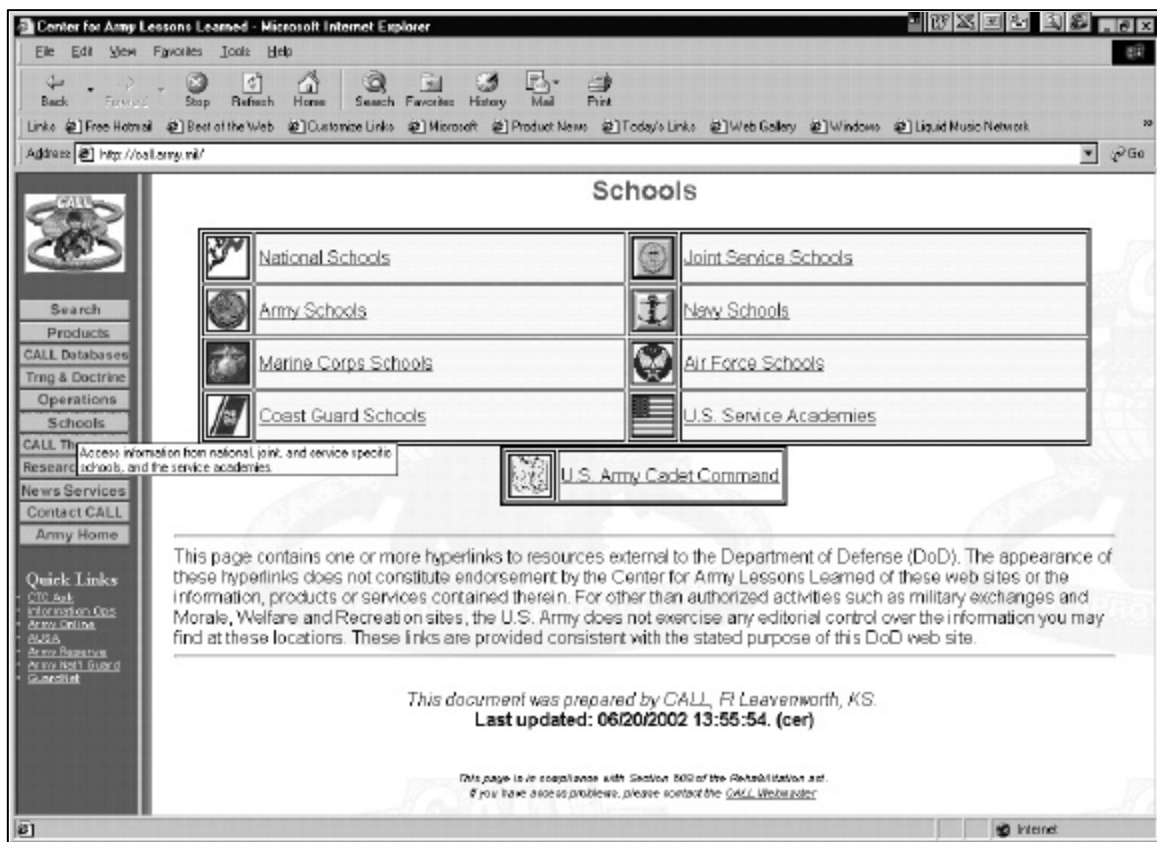
Figure 78. Schools Component

CALL Dictionary and Thesaurus

The CALL Dictionary and Thesaurus component (Figure 79) provides references

services by using a search engine linked to sources of military terminology.
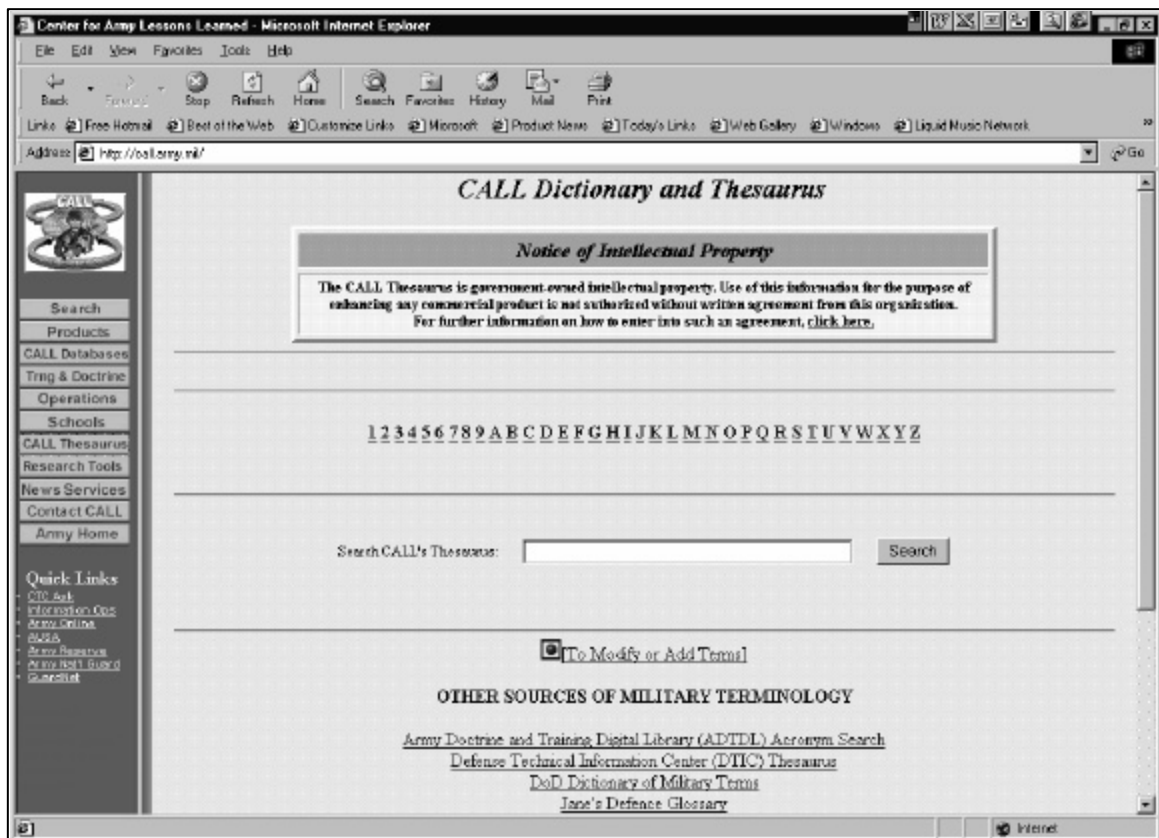
Figure 79. CALL Dictionary and Thesaurus Component

Research Tools Online

The Research Tools Online component (Figure 80) provides hyperlinks to various

resources and research tools.
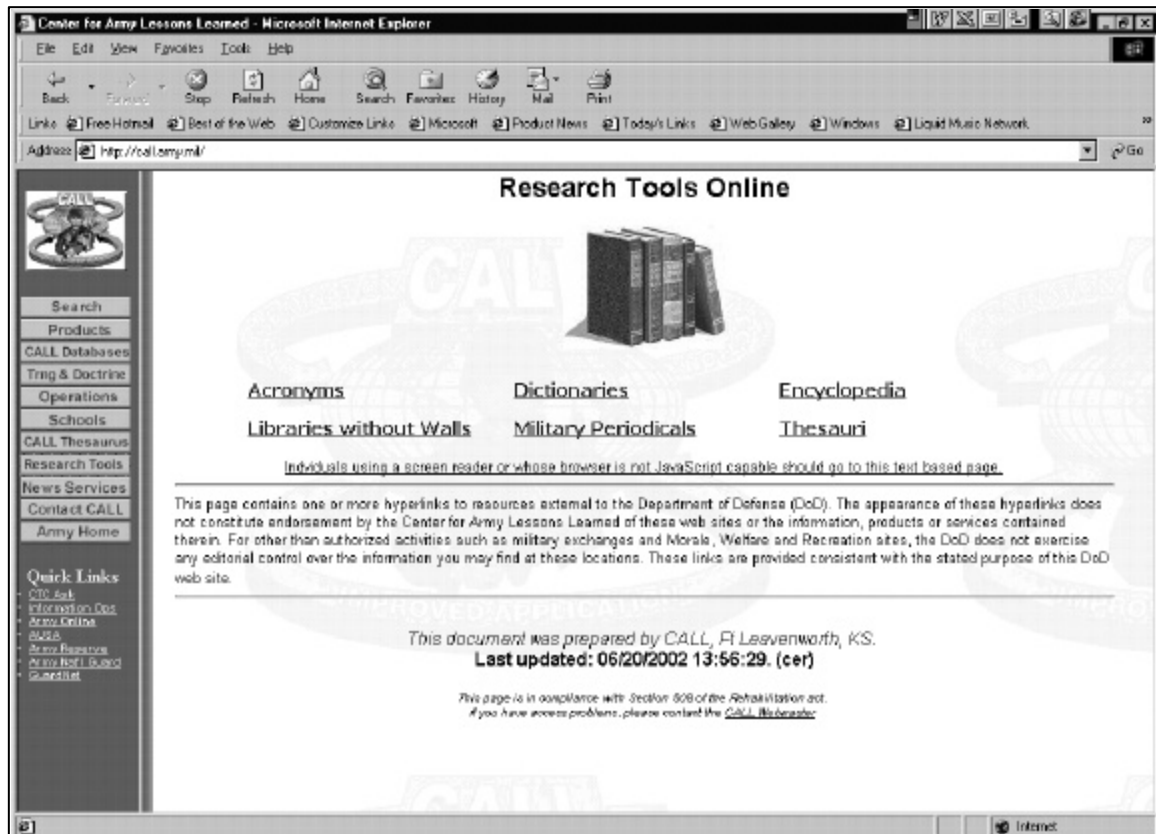
Figure 80. Research Tools Component

News Service Links

The News Service Links component (Figure 81) provides access to information

on the latest breaking news from a variety of news services including hometown and

international sources.
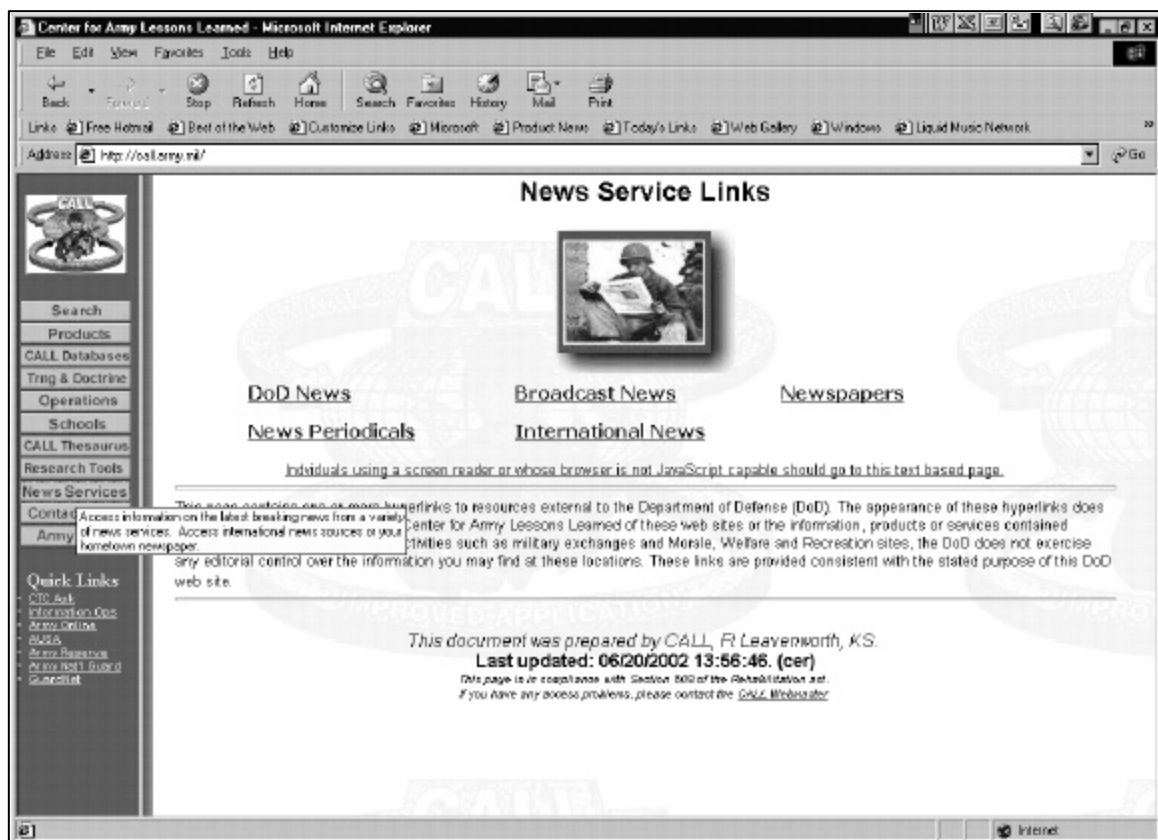
Figure 81. News Service Links Component

Contact CALL

The Contact CALL component (Figure 82) is a tool that allows customers to ask questions of the CALL staff, submit suggestions, and to also input lessons learned. It also gives a brief summary of CALL and its mission.
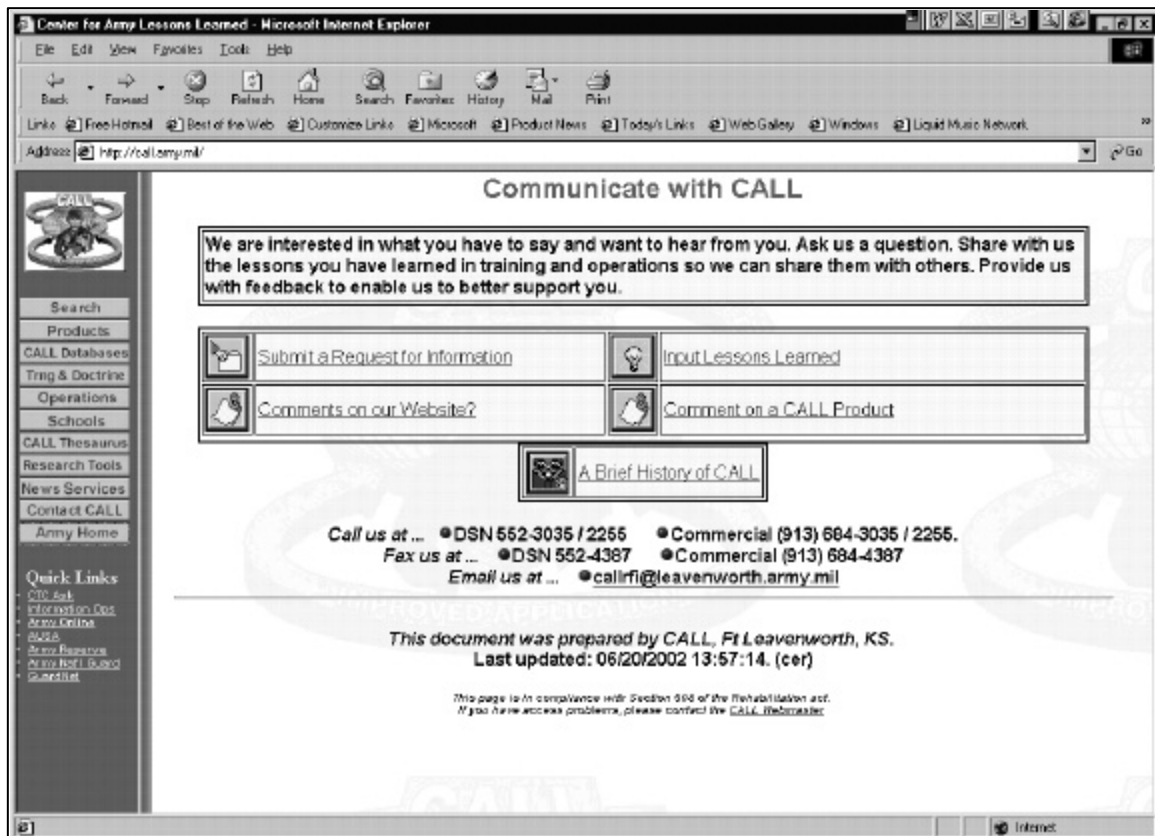
Figure 82. Contact CALL Component

The CALL website homepage (Figure 83) also offers quick links to other

information sources as well as provides access to information on the latest hot topics.
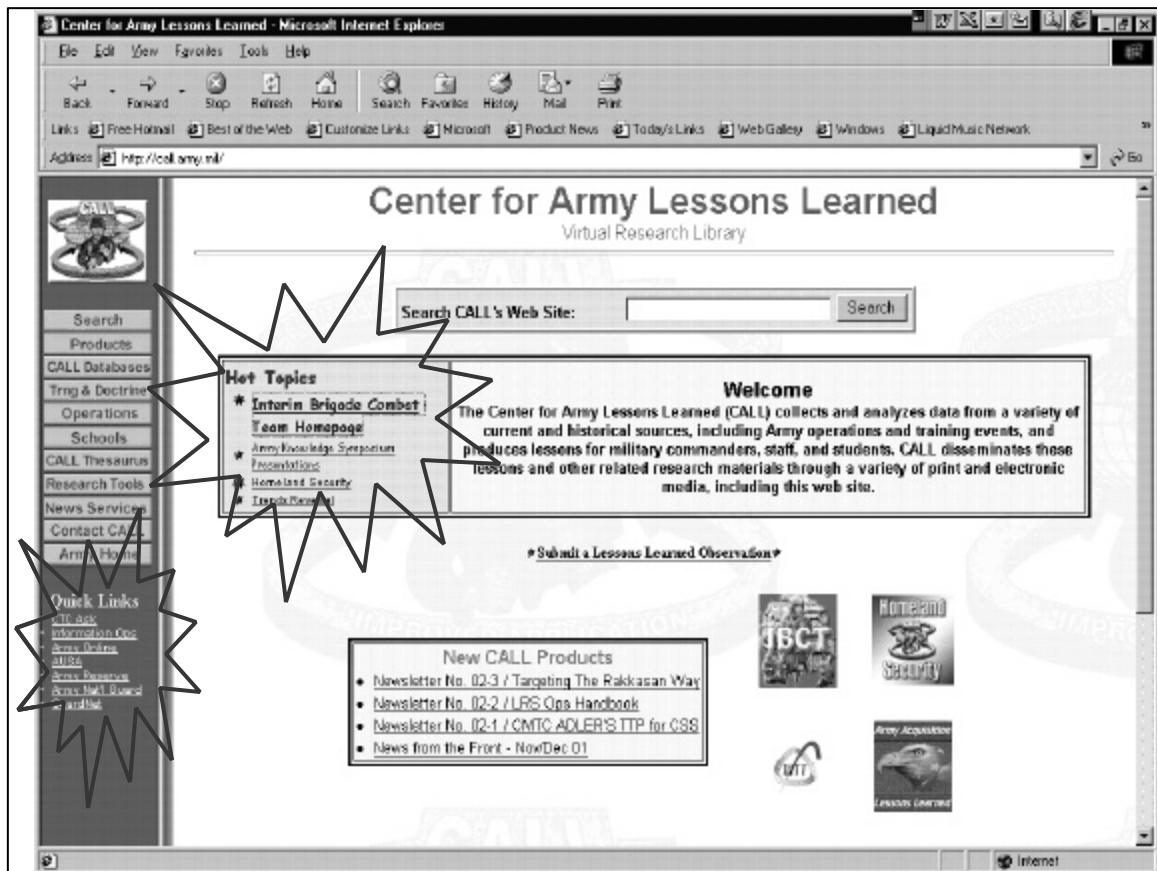
Figure 83. Additional CALL Resources

CALL Staff

The CALL staff describes itself as a multi-disciplinary, multi-skilled team of

professionals. It is composed of military and civilian analysts, historians, library

scientists, records management specialists, information management specialists,

information systems specialists, and archive technicians. The total number of personnel

currently on staff is 71. The CALL organization consists of four divisions in addition to

the headquarters function. The Lessons Learned division further consists of Combined

Training Center (CTC) Cells and the Interim Brigade Combat Team (IBCT) cell. The

CTC Cells include personnel that are assigned to each of the three Combat Training

Centers—the National Training Center, Ft. Irwin, CA; the Joint Readiness and Training

Center, Ft. Polk, LA; and the Combat Maneuver Training Center at Hohenfels, Germany.

Each cell has a military and civilian analyst at each location to collect lessons learned

from the training that occurs there.

The IBCT is the name for a new unit structure that the Army is using as its basis

for transformation. The first IBCT is located at Ft. Lewis, Washington, where a

contractor mans the cell and collects lessons learned. Also located under the Information

Systems Division is a cell the conducts special projects in association with Ft.

Leavenworth Director of Information Management (DOIM). The CALL organization

structure is shown in Figure 84.
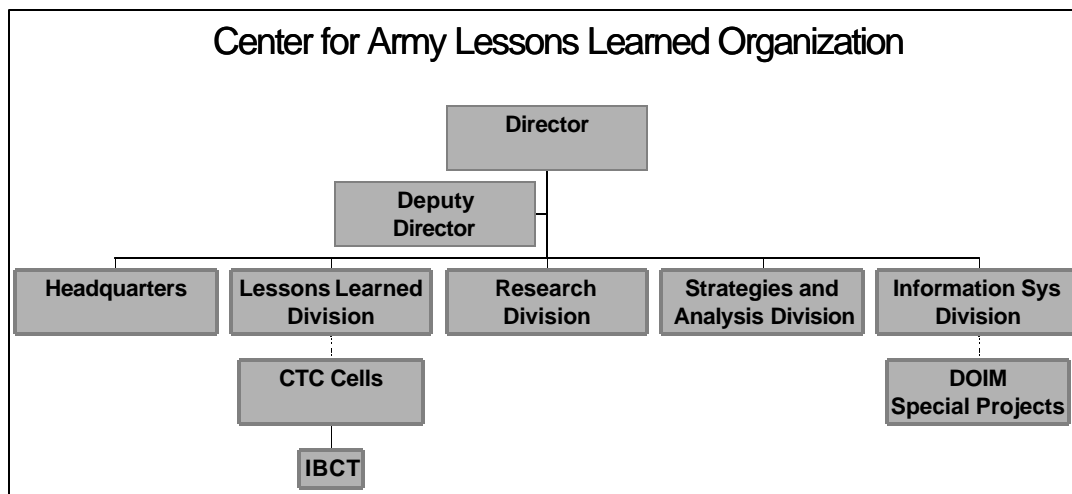
Figure 84. CALL Organization Structure

Findings on Influence Factors that Act as Barriers to KM at CALL

Managerial Influence Factors

The purpose of the first research question was to identify managerial influence

factors that act as barriers to organization knowledge management. Using Holsapple and

Joshi's influences framework (2000) as a template for discussion, the following

managerial influence factors are discussed: leadership, coordination, control, and

measurement. The findings are discussed in the general order the questions were posed.

Leadership Factors

Lack of executive leadership commitment. For CALL, the issue of executive

leadership commitment to all its efforts, including KM, has been mixed. At times, CALL

has benefited from the support of very powerful executive leaders to include high-ranking

Army generals and Congressmen. In fact, its programs have been saved from

"extinction" on more than one occasion due to the intervention of key executive leaders.

Across the board, however, CALL has suffered from wavering executive leadership

commitment. Depending on their personal knowledge of KM and the intensity of

political pressures, key leaders have either supported CALL or left it victim to competing

interests. Dr. Rick Morris stated as an example, "The one-stars for whom we work have

gone back and forth in how supportive they are because there have been at times

extensive countervailing pressures. …there was one one-star who would have sold us out

in a heartbeat." CALL also experienced a period of time when it fell out of favor with

the Army CIO organization, whose support was essential to many efforts. This situation

was the result of CALL taking matters into its own hands in regards to developing

leading- edge records management solutions. CALL only took this approach because there was an absence of guidance from the CIO's office. Although the organizations eventually reconciled and the powerful Director, Enterprise Integration, Office of the CIO/G-6 (formerly the Office of the Director for Command, Control, Communications, and Computers), Ms. Miriam Browning, became one of CALL's biggest supporters, the temporary decrease of CIO leadership support proved uncomfortable and for a brief interlude threatened CALL's activities and vision for the future.

Lack of reinforcing behaviors. The lack of higher-level leadership support also did not always help to reinforce new behaviors and inculcate a new KM-oriented culture throughout the Army organization. Although the entire CALL organization and leadership was committed to the concepts of KM, a similar level of commitment did not exist at all levels of the Army organization. In its role as a provider of knowledge and purveyor of knowledge management, CALL was limited in its ability to effect change in user organizations and at the higher levels of the Army organization. The recent acknowledgement of the importance of KM by the Chief of Staff of the Army was encouraging as was the growing number of grass roots KM efforts, but indications of a true culture change (spearheaded by leadership actions) on a large scale were not yet evident.

Difficult to "sell" KM/Lack of language. Like many other organizations engaged in promoting KM, CALL found it extremely difficult to do so. Not only did the ideas that underpin KM threaten existing institutions and ways of doing business, but also the

language used to describe it was, for many, unfamiliar and without context. Regarding

the threat to existing institutions, Dr. Morris stated,

> "…[to] put it in a nutshell, we ran counter to various interests, or at
>
> least those interests perceive it that way. If I were them, I would simply
>
> recognize the fact that we belong to them and they can take credit for
>
> whatever we did. …However, that has not been the case. And so we have,
>
> at various points in time, run afoul of the Army distance learning program,
>
> the training program, and at times…the Army records management
>
> program."

In reference to the absence of "language' to properly describe KM, Colonel Mike

Hiemstra, Director of CALL, stated,

> "The services are by their nature conservative organizations. When you
>
> introduce this topic called knowledge management they kind of go 'woo-
>
> woo.' And a lot of people are uncomfortable with that topic. Just the term
>
> knowledge management becomes a barrier to communication. So you sort
>
> of have to work around getting people to understand the concepts without
>
> mentioning the words knowledge management."

Given these challenges, the CALL staff knew that selling KM would be an ongoing

challenge. A week previous to the case study, the staff had hosted the second annual

Army Knowledge Symposium. Despite the overwhelming response and attendance, they

knew similar gatherings and educational seminars would continue to be a key element in

the diffusion and acceptance of KM.

Difficult to "lead" KM effort. Because so much of what CALL saw necessary in adapting technology and processes had never been done before, they often found themselves on the "bleeding edge." From a leadership perspective, this was both exciting and uncomfortable at the same time. Dr. Morris reflected that they had not always known the right path to take so they did their best to learn from the corporate world and from what was available in the literature. Dr. Scott Lackey, Chief of the Research Division, gave an example by describing the archiving effort for the Gulf War records. He stated that in the 1992-1993 timeframe CALL had been given the general task of making the Gulf War records available electronically to the Army Command and General Staff College. At that time no similar project existed, so Dr. Morris was left to conceptualize how the whole process would work—from the delivery of truckloads of documents to scanning and electronically archiving each one. Together he and Dr. Lackey made it happen, but with every choice —whether it involved software, hardware, or process—they were never completely sure they had made the right decision. Especially disturbing were thoughts that the natural, yet uncontrolled (and unpredicted) migration of technology could quickly make obsolete all that they had done.

Another issue that complicated efforts to lead KM was the fact that existing paradigms about organizational structure made it difficult to discuss concepts and propose ideas that cut across organization boundaries. Dr. Morris stated that it was difficult for leaders and others to understand how emergent learning could be integrated into the existing hierarchical, doctrine-based approach. Overall, leading the KM effort

presented challenges not only knowing what to do next, but also being able to communicate the chosen path clearly enough to get leadership understanding and support.

Coordination Factors

    Difficult to coordinate between owners of information. Because CALL's archiving efforts involved other organizations' information/lessons learned, there had been conflict in the past regarding content approval and release authority. Dr. Morris described the situation as follows.

> …In the birthing of CALL from 1985-1989, there was a great
>
> debate that's never been completely overcome as to how thoroughly
>
> lessons learned had to be vetted before they could be published. There
>
> was a moment in the late 80s where CALL for a year didn't publish
>
> anything because there was an insistence that we had to get the approval
>
> of every two-star general in TRADOC, which took literally forever. They
>
> finally said, no, this can't be. And so we've achieved in the course of time
>
> a sort of working compromise whereas we develop lessons learned, for
>
> example, in the actual operation, [and then] a combined arms assessment
>
> team will make its observations. Those observations will be…worked by
>
> the team together. They'll be reviewed by analysts back here and then
>
> they'll be sent back to the unit from whose operation they were being
>
> observed so that they are vetted and cleaned. And then ultimately, they
>
> will pass the approval of the unit commander in the field which is
>
> important for a number of reasons including making sure that the

observers have got it right and have drawn the right conclusions.…And so,

every director of CALL has had to fight the fight and make sure that we're

on the one hand sending sound tactics, techniques, and procedures out to

the field, and then on the other hand to make sure that we're not locked in

the mud so the turnover of new knowledge is thoroughly slowed down."

The coordination issues addressed by Dr. Morris continue to be a challenge for

CALL.

Executive leadership needed to guide coordination. Over the years CALL has

been involved in many efforts which are now coming together under the conceptual

umbrella of knowledge management. Because so many of CALL's initiatives have been

strategic in nature and counter to accepted ways of doing business, the necessity for

executive leadership involvement and championing has been great. Executive leaders

who are strong proponents of CALL have been key in facilitating and coordinating

efforts that cross organization boundaries and run counter to conventional approaches.

They have also been essential in giving CALL a voice when it might otherwise not be

heard by the higher levels of leadership. Without this kind of executive leadership

support, CALL, in its relatively low position in the Army organizational hierarchy would

be in many cases powerless to accomplish the far-reaching, high-impact initiatives it is

pursuing. In order to further the concepts of knowledge management and to implement

practical applications such as the Warrior Knowledge Network, CALL understands the

challenge is to continue to cultivate executive leadership support as well as build

consensus for its efforts at every opportunity.

Coordination with IT organization critical. Due to the nature of its mission, CALL has always understood the necessities of proper coordination and a good relationship with the IT organization. Whether the IT organization of concern has been the local Director of Information Management (DOIM) at Ft. Leavenworth or the Army-level CIO office, CALL has made a concerted effort to work closely with either or both depending on the issue. Because so much of what CALL does crosses into the traditional IT realm (i.e., records management, information management, information systems, etc.), coordination has not always been easy or trouble free. Although Dr. Morris attributes much of his early success to the reputation and vision of the local DOIM, Mr. Robert Wright, and subsequently to Ms. Miriam Browning in the Army CIO, and her boss, Lt. Gen. Peter Cuviello, the Army CIO/G-6 (and his predecessors) continued communication, coordination, and consensus building is required.

Control Factors

A variety of control-related factors were identified by the CALL staff as being barriers to their KM effort.

Restrictive impact of external control policies. The existence of external control policies regarding IT plans, records management, Freedom of Information Act, usability standards, Privacy Act, and domain specific repositories were often seen as frustrating and unnecessarily restrictive. As for IT plans, Dr. Morris cited an instance when, in 1995-96, the Combined Training Center (CTC) Master Plan was published and there were tremendous subsequent efforts to destroy Army Knowledge Network. He stated,

"The CTC Master Plan on the one hand showed exactly what the field

needed. It showed that the existing systems getting into the field were

broken, including very expensive systems. It also showed that there had to

be a marriage between AKN and CALL."

He further related that when AKN and CALL were brought together, that the TRADOC

East tried to "wink out" the money for the AKN side of the house because it threatened

what they were doing with respect to training automation. In this instance, the IT part of

the CTC Master Plan almost drove AKN out of business.

As for records management policy implications, the inadequacy and/or lack of

records management policies that addressed issues CALL dealt with was frustrating.

Because of the leading-edge nature of what CALL was tasked to accomplish in the area

of electronic records capture and archiving, they constantly pushed the envelope of

existing records management policy. For the most part, records management policy at

the time was focused on paper-based records. In addition to the uneasiness associated

with developing electronic records management solutions for the first time, the CALL

staff had to battle the perception that they were mavericks working outside their area of

expertise and infringing on the duties of the office of primary responsibility. Dr. Morris

reflected that CALL would have been happy to take suggestions about how to do what

they had been tasked to do, but no one had suggestions because it had never been done

before.   Despite the trials and tribulations, CALL finally won the approval and

admiration of many of their opponents and naysayers. CALL, in its success of marrying

lessons learned with a knowledge network directed at explicit knowledge, became world

famous for its technological innovations. Not only did it get firm backing from the Army

CIO's office and the Archivist of the United States, CALL was chartered as the DoD

Digital Information Technology Testbed.

One ramification of the Freedom of Information Act was also a constant source of

concern given the nature of the records kept by CALL. As the owning organization of

many records, CALL was responsible for responding to FOIA requests in accordance

with U.S. law. Although FOIA is an important law that gives individuals access to

certain government records, the FOIA response system puts an incredible burden on

organizations that own the information. Dr. Lackey remarked that FOIA was "the

biggest unfunded mandate ever passed by Congress." Given the potential impact and

workload associated with FOIA, Dr. Lackey continually stressed the need for CALL

systems to allow users to access releasable documents directly from the web.

As for usability issues, compliance with the federally mandated Section 508 of the

Rehabilitation Act (e.g., graphics without readable text captions) had been a significant

issue with the information systems staff. Mr. Clayton Robertson, CALL webmaster and

search engineer, stated that direction about how to comply and implement Section 508 on

local websites was confusing and that implementation was incredibly time consuming.

He stated that if it was determined that his webpages had to comply with 508 that a

contractor would have to be hired, because there was "no way two webmasters can sit

down and go through 30 or 40,000 pages and do our normal job…in anything less than

two years." Mr. Robertson also alluded to some new rumors associated with the Privacy

Act regarding restrictions on publishing personal information over the web. Although he

was not aware of any formal policy changes just yet, he acknowledged that there was much discussion regarding proper interpretation of the rules.

Finally, Mr. Jim Ritter, Chief of Plans and Operations, mentioned the growing impact of domain specific digital libraries. He stated, "The idea is that we have to be able to deliver information, exactly what the user wants, whatever format they want, whatever tool that they have and there is no digital library that will do that. Digital libraries are all domain specific, and now we have gotten to the point in so many of them where you can't download the materials from it and put it up on your website because the standard line is 'I am the official repository'." Mr. Ritter felt that such policies did not facilitate the building of local repositories that were robust and easy to search.

Lack of internal control policies. The lack of internal control policies for a variety of issues had recently become an area of concentration for the CALL staff. As the CALL databases grew and the KM program as a whole had become more robust, the staff found the need to address issues such as content management, records management, taxonomy development, and guidance regarding the formation and operation of communities of practice. Regarding development of various policies, Colonel Hiemstra stated,

> "We've gotten into a number of areas that we think are important because
>
> of the implications of information…implications of doing things in an
>
> electronic environment. We have a large database of documents--
>
> somewhere over three million pages that we have taken from paper,
>
> scanned, and put into a digital format. There are all sorts of issues that

arise from that as the database gets bigger…problems of categorization

and linking things."

As a result, CALL had put library scientists and records managers on the staff to help sort

out the issues and develop appropriate courses of action. The need for an overarching

taxonomy on which to organize the information/knowledge was also recognized. The

lack of existing taxonomies and standard policies for metadata and metadata tagging also

left CALL to create its own internal processes and procedures. Finally, Mr. Ritter

discussed the evolving Warrior Knowledge Network and the necessity of mandating

certain principles of operation for the communities of practice. Following the example of

the Total Quality Management guru, Dr. Edward Deming, Mr. Ritter stated that he and

his staff had established a specific model for what a community of practice must look like

and how it must operate. He said,

"…we go out and say, okay, you need this, and you have to do this, and

we will work with you. We have a real clear model of what a community

of practice looks like, and we provide the [technical] infrastructure…and

assistance on [in-putting] materials."

Although the arising need for additional policies and guidance was a natural evolution of

the KM effort, the lack of the policies at the local and higher levels and the need for their

development had presented difficult challenges along the way.

   Social control challenges. There were very few elements of social control that

appeared to negatively impact CALL's ability to continue to implement facets of

knowledge management. In fact, the KM staff leaders had been quite resourceful in

making beneficial personnel and organization changes. Colonel Hiemstra stated that although the civilian and military human resources system did not always facilitate the gaining of staff members with the necessary knowledge and expertise, that CALL had made every effort to grow these resources in-house.

Measurement Factors

"Measuring" and or "valuing" the contribution of KM to the organization was presented by the respondents as a relevant concern. The main issues involved measurements needed for leadership support and the lack of appropriate measurements/metrics.

Measurements/value needed to gain/keep leadership/user support. From the comments of most respondents, it was evident that CALL's successes and its ability to prove the value of what it was doing had been critical in winning and maintaining leadership support. Top-level recognition of its innovations by DoD, the Archivist of the United States, and high-ranking Army generals perpetuated support when its programs were momentarily endangered. Despite the continued support, Colonel Hiemstra stated,

"..nobody's existence is assured in a resource-constrained environment.
…We are a service provider. As long as people believe that our service is important our existence is relatively assured. When people begin to think that the service we provide is no longer important, no longer relevant or timely, then we begin to have a problem."

Commenting on the support of users in general, Mr. Ritter stated, "You have to provide value from day one. The first time somebody comes on [a] site, they have to think it's

really good." With these ideas in mind, the CALL staff understood the necessity of providing value and proving value to the communities they serve and were responsible to.

Lack of appropriate measurements. In trying to provide measures of their success both internally and externally the CALL staff constantly struggled with the lack of appropriate measures. Asked if CALL had experienced any external pressure to prove value, Colonel Hiemstra responded, "We're always under pressure. And the problem is it's very difficult to develop that metric---that magic metric." Like many other organizations, the CALL staff used software to track website use statistics such as number of hits, duration of visits, etc., but Colonel Hiemstra stated that "those don't work for us." Colonel Hiemstra conceded that CALL did run statistics on the website to get an understanding of how many people accessed the site, how long they stay on the site, and what they downloaded. These statistics, however, had not provided solid evidence of the value to the Army. As an alternative, Colonel Hiemstra stated that he primarily relied on qualitative examples of success and anecdotal comments from customers.

The CALL case study indicates there are a variety of managerial influence factors that acts as barriers to organization KM. Table 22 summarizes these influences.

Table 22. Summary of Managerial Influence Findings for CALL

Influence Factor	CALL Findings
Leadership	• Lack of executive leadership commitment • Lack of reinforcing behaviors • Difficult to "sell' KM • Difficult to "lead" KM
Coordination	• Difficult to coordinate between owners of information • Executive leadership needed to guide coordination • Coordination with IT organization critical
Control	• Restrictive impact of external control policies • IT plans • Records management • Freedom of Information Act (FOIA) • Section 508 compliance • Privacy Act • Domain specific repositories • Lack of internal control policies • Content management • Records management • Taxonomy development • Community of Practice guidance
Measurement	• Measurements/value needed to gain/keep leadership approval • Lack of appropriate measures

Resource Influence Factors

The purpose of the second research question was to identify resource influence

factors that act as barriers to organizational knowledge management. In investigating the

question, financial, human, material, and knowledge resources were addressed.

Financial Resources

Lack of adequate funding. Although CALL was very cognizant of the resource-

constrained environment in which it operated, it had been very fortunate to maintain

sufficient funding for its operation and primary projects. Due to the creative abilities of

the staff, funding (in addition to what was earmarked through TRADOC channels) was

procured through special grants for efforts such as the DoD Information Technology

Testbed and Warrior Knowledge Network. Although respondents did not indicate any

particular funding shortages, Colonel Hiemstra was cautious about the future. He stated,

> "…every year there's an attack on CALL's resources. …The thing I worry
>
> about most is not that somebody would walk in and suddenly say that the
>
> Army can't afford to have CALL anymore so we're just going to make it
>
> go away. There's too much high-level support for that. There's a more
>
> insidious process that I think I have to be aware of which is each year
>
> somebody cuts off a little piece of you. So it's like death by a thousand
>
> cuts."

Comments from other respondents indicated that funding was not always available to do

what they saw as necessary. Mr. Ritter referenced the lack of funding for COPs, and Mr.

Robertson identified the lack of funding for software purchases.

Restrictive budgeting environment. The cyclical, inflexible, and long-lead time

nature of the military budgeting process negatively impacted the CALL KM efforts. The

fact that CALL is a small organization situated very low in the organization hierarchy had

its disadvantage as well. On this issue, Colonel Hiemstra stated, "…it's very hard to have

our voice heard, as [we] work our way up a designated deliberate chain to get to the

resource management—where the resource pie is being cut into pieces." He added that

often CALL's programs got rolled in with others. And, if these programs were funded,

the money did not always make it back to CALL. Additionally, the functional stovepipe

nature of the funding process made it difficult to establish requirements and receive

funding for CALL efforts. Dr. Morris cited the example that although Congress had

delivered funding plus-ups for CALL as a result of their work in multimedia archiving

and analysis (which provided critical support for the Bosnia and Kosovo operations), that

the follow-on year (Program Objective Memorandum) money never made it back to

CALL (nor did all the Congressional add-ons). He summarized, "So we're still

struggling to institutionalize the funding against Warrior Knowledge Network."

Human Resources

Lack of manpower availability. The lack of manpower available to commit to KM

was not as much of a concern for CALL, itself, as it was for its user organizations. In

fact, at the time of the case study CALL's manning statistics showed that CALL was

staffed at over 200% of its authorized level. Respondent comments focused primarily on

field organizations where individuals were needed to implement and experiment with

KM practices. Colonel Hiemstra stated, "People as a resource is always going to be an

issue. There are thoughts sometimes that you can replace people with technology." He

cited that entire career fields, such as company clerks, had been disbanded and others

were in danger of following simply because it was thought that technology could replace

them. The problem, however, was that the technology did not replace the intellectual

processes involved in doing the jobs. This situation only compounded the lack of

manpower left for activities such as KM. Dr. Morris cited the phenomenon that grass-

roots KM efforts were usually done "out of hide" and on individuals'/organizations' own

time—at least at the beginning. This happened because, for the most part, the KM efforts

did not fit in an organizational niche, which confounded further efforts to fund and man

them given the functional stovepipe paradigm.

Negative impact of turnover. The impact of personnel turnover was also an

important human resource issue. Although frequent turnover of military personnel was

an accepted part of the military culture, it nevertheless continued to have a negative

impact on CALL efforts. The departure of retirement-eligible civil servants was a

concern as well. Luckily, the CALL organization had experienced a relatively stable

staffing situation from 1999-2001. During the last six months, however, there had been

an unusual amount of turbulence in terms of civilian personnel precipitated by

promotions to positions outside of CALL and to retirements. Colonel Hiemstra explained

that CALL had a hard time offering civilian personnel promotion opportunities due to the

grade limitations associated with the positions. Although it was recognized that

personnel turnover allowed new ideas to flow into the organization, loss of critical

expertise was a very real concern.

Lack of KM knowledge, expertise and skill. As was mentioned earlier, the KM

staff did not always possess the knowledge, expertise, or skill to know what path to take

next. In fact, there were individuals on the CALL staff who admitted not knowing much

about knowledge management at all. The same was true of much of the Army leadership

and the Army population at large. For the most part, knowledge management had not

been a part of the Army vocabulary until it began to be popularized in late 2001. The

lack of KM expertise, knowledge, and skill adversely impacted the CALL KM effort in

two ways. First of all, it made it hard for the staff to communicate effectively with other

staff members and users integral to CALL KM efforts. Secondly, it made it extremely

difficult to sell the KM concept to leadership and those on the outside. Dr. Morris was

encouraged, however, that a new cadre of master practitioners at the level of major and

lieutenant colonel now existed that would help carry KM concepts forward.

Material Resources

Limited options for hardware/software. The procurement of necessary hardware

and software for CALL systems was seen as only a slight barrier to KM efforts according

to respondents. The lack of funding to procure a new search engine and the use of free

collaboration software were specific problems identified, but neither was portrayed as

significant impediments at this time.

Challenges of technology evolution/migration. The CALL staff was constantly

faced with the challenges of technology evolution and the subsequent migration of

systems to new technology. When asked about barriers to KM, Dr. Scott Lackey cited

migration as his number one choice. Because so many of CALL's technology solutions

were leading edge and changes in technology happened so quickly, it was impossible for

the staff to know exactly which configuration or process would ensure the best longevity.

Dr. Lackey stated that they had to deal continuously with migration issues at many levels

to include platform migration, storage media migration, and retrieval ware migration.

Dealing with such issues was not only time consuming but costly as well.

Existing systems inadequate. Some of the respondents felt that the inability to

procure the latest advances in software drove the organization to develop less-than-

leading edge products that did not support the KM objectives in the best manner possible.

The free Quickplace collaboration software was not very easy to use and customers had indicated that they didn't want to "hassle" with it. Many of the search engines were also identified as not working very well either. Mr. Robertson indicated that because the search engines were not very intuitive, that individuals needed practice to learn how to make them perform as expected. Mr. Ritter indicated that systems, in general, still needed to be more usable for customers. He stated that focus of the systems should not be to provide users with the "book" but instead the "right answer."

Inadequate facilities. A unique challenge for the CALL staff had always been the procurement of the necessary facilities to house their operations. Due to the unique nature of their early archiving efforts, the staff needed significant amounts of environmentally controlled workspace in order to store, process, and safeguard the tons of paper records they were responsible for scanning and archiving. Building space was a politically charged issue at Ft. Leavenworth and CALL was often the center of discussion. Although the facilities issues eventually worked out in CALL's favor, it was not without a lot of time and effort in both convincing the leadership of the necessity for the space and recovering the space once it was assigned to them.

Knowledge Resources

Human knowledge resources. To reiterate, human knowledge resources are described by Holsapple and Joshi as the "raw materials" for knowledge activities (2000. P.241). The existence of human knowledge resources throughout the AMEDD was extensive. The negative influences of these knowledge resources on the KM effort are described below.

Lack of tacit knowledge capture. Until recently, the focus of CALL's efforts had been primarily on the capture and dissemination of explicit knowledge. Deciding how to address tacit knowledge for the warfighter had been a big challenge. The situation was changing, however, with the introduction of the Warrior Knowledge Network (WKN). The Warrior Knowledge Network uses a web-based platform to provide tailored, timely, and relevant knowledge and information. It does so by providing access to such knowledge by supporting the identification and creation of communities of practice (COPs). COPs are defined as "voluntary associations of people who are bound together by a shared passion for a particular practice" (Swan, 2002, para. 6). The WKN addresses the issue of tacit knowledge by leveraging new and emerging methods of knowledge creation and transfer. It "provides the tools that help leaders and soldiers understand first" by providing them needed knowledge from peers, subject-matter experts, mentors, virtual staffs, and other knowledge resources," explained Dr. Morris. Although one garrison application of the WKN, the Installation Crisis Support System, had already been implemented, the challenge ahead was to develop additional applications in support of the tactical warfighter.

Incompatible knowledge/info stores. Data incompatibility and the inaccessibility of information stores had been a problem for CALL throughout its existence. In the earlier days of its archiving efforts, the historical staff had to deal with stores of data/information such as the truckloads of unorganized paper data from the Gulf War, 29,000 VHS tapes from the CTC, and 80-channel audiotapes of conversations from the training battlefield. Even as the CALL effort evolved, the staff continually faced

compatibility problems. At the time when AKN and CALL merged, in 1996, the staff

found that many of the items previously archived by CALL could not be uploaded to

their systems. At the current time, the CALL staff is still facing a myriad of data format

mismatches in trying to merge databases and establish consistency throughout the

archiving and retrieval processes.

Lack of "knowledge about knowledge management." The "lack of knowledge

about knowledge management" was an issue that the CALL staff battled on many fronts.

Although key CALL staff members were very educated about knowledge management,

such was not always the case at higher leadership levels, throughout the Army

population, and even with some CALL staff members. Colonel Hiemstra suggested that

although there was some confusion about the term "knowledge management," it was

what CALL had been doing all along. He stated, "We were doing knowledge

management…before we knew it was knowledge management." The lack of

understanding, however, about how lessons learned and action learning concepts fit into

the realm of knowledge management required CALL to continually educate, explain and

advertise to individuals at all levels of the Army organization.

Lack of knowledge about KM–supportive organization culture. According to

respondents, resistance to change and the slow adaptation of a KM-supportive culture

continued to be a challenge. Dr. Morris stated, "…as much as we've had rhetoric in DoD

about being a learning organization, we've really been a training organization." Colonel

Hiemstra added, "…the armed services in general, I think, are uncomfortable with

change." Besides the resistance to change, many individuals simply did not have the

knowledge of what a KM-supportive culture might look like. The purpose of communities of practice, the concepts of action learning, and role of information technology and how each piece fit into the KM puzzle were simply not common knowledge. Despite inconsistent understanding/support for KM across the many levels of Army, CALL appeared to be making key advances in transforming the Army to a knowledge-sharing/knowledge management-oriented culture. CALL's position in the organization hierarchy obviously impacted its ability to enable such change, but its visibility and association with key supporters made it a powerful force in the new Army KM movement.

Overall, the CALL case study indicates there are a variety of resource influence factors that acts as barriers to organization KM. Table 23 below summarizes these influences.

Table 23. Summary of Resource Influence Findings for CALL

Influence Factor	CALL Findings
Financial	• Lack of adequate funding • Restrictive budgeting environment
Human	• Lack of manpower availability • Negative impact of personnel turnover • Lack of KM knowledge, expertise, and skill
Material	• Limited options for hardware/software • Challenges of technology evolution/migration • Existing systems inadequate • Inadequate facilities
Knowledge	• Lack of tacit knowledge capture • Incompatible knowledge/information stores • Lack of "knowledge about knowledge management" • Lack of knowledge about KM-supportive culture

Environmental Influence Factors

The purpose of the environmental influence factor category according to

Holsapple and Joshi (2000) is to capture and separate those influences that are external to

the organization being examined. For the purposes of this research, the definition of

"external" was defined as outside the confines of the immediate KM program

organization. In the case of a large military organization such as the Army, influences at

the major command levels and higher can be considered external to smaller, far-removed

organizations such as CALL. The influences discussed below were considered external

to CALL, but all such influences weren't necessarily external to the Army as a whole.

GEPSE Climate

The GEPSE (governmental, economic, political, social, and educational) climate

ultimately impacts all aspects of the military organization. The influences of this climate

are passed on to the military through political channels as well as through military

leadership and the individuals who serve. Recognition of these influences, however, at

the lower levels of the organization hierarchy is spotty at best. In the case of the CALL

respondents, the impact of these influences were seen to be much more indirect than

direct.

Negative impact of politics. The influence of national politics on the military,

CALL, or otherwise was rarely mentioned, however, the resultant reductions to the

military budget, especially the military healthcare portions, were accepted as an indirect

impact. The influence of internal organizational politics was mentioned much more

frequently. Dr Morris stated, "At every step of the development, we have had to do very

extensive consensus building, very extensive briefings at every level. We've often had to engage in …extended bureaucratic fights in order to carve out the freedom to run." As described by the respondents, internal politics (at various levels within the CAC, TRADOC, and the Army) had negatively impacted the KM efforts in many ways.

Negative images of KM. The negative images of KM portrayed in the press and through failed claims of consultants did nothing to aid CALL's KM efforts. The media hype and the suspicion by many (leaders included) that KM was just the latest management fad was an obstacle hard to overcome.

Organization structure implications. A unique environmental factor identified was the influence of organization structure. The fact that the KM program "home" was situated at the lower levels of the CAC, TRADOC, and Army organizations negatively impacted the visibility of the KM program staff and their efforts. Chain of command issues also made it very difficult to pursue, execute, and get funding for strategic initiatives that reached across the Army. Overall, the military-centered cultural expectations and paradigms about lines of authority and organization hierarchy somewhat stifled the CALL KM efforts. The fact that CALL was a non-IT organization was also a drawback with respect to approval and coordination for various initiatives. Dr. Morris summarized the situation by stating, "…there's no question that the knowledge-based, network-centric learning organization holds very considerable threats to existing hierarchical ways of doing things, funding things."

Negative impact of "stovepiped" culture. Closely related to the organization structure influences were the influences of the functional stovepipe mindset. All of the

services, including the Army, operate in a very stovepiped manner, especially in regards to funding and requirements analysis. The negative impact of this stovepiped mentality for CALL was that it thwarted efforts that crossed organizational lines and functions. Given that the future focus of CALL was emergent learning, they were seen as a threat especially to TRADOC, the de-facto training and education stovepipe. Dr. Morris stated, "…this approach threatens the principles upon which they have traditionally supported learning. It threatens their programs. It threatens their sense of self-worth." Given the very non-hierarchical and non-stovepiped nature of emergent learning, the respondents indicated that they were confident that there would still be many battles ahead.

Challenges of social expectations. The CALL staff recognized the challenges of changing social expectations. The nature of younger officers' and enlisteds' expectations were no longer what they used to be regarding to what they expected from the Army, the technology, or even the knowledge that CALL was trying to offer. Mr. Ritter and Dr. Morris remarked that today's users wanted "answers" not just "buckets" of information. Mr. Ritter also recognized the challenges associated with many individuals' existing paradigm that the digital world was a simple reflection of the paper-based world. He stated that if CALL was to continue to make information and knowledge work better for people, it had to be done in methods other than through building digital libraries. His work with breaking down information into objects that could be manipulated in limitless combinations continued to be a "paradigm-breaking" experience.

Challenges of educational expectations. In addition to changing social

expectations, CALL and the Army at large were aware of similarly changing educational

expectations. The new generation of Army personnel expected a different kind of

learning experience than previous generations. Not only was the new generation very

expectant of the technology tools, but they desired simple, "dead-on" answers as opposed

to an overload of disparate information. These changing expectations combined with the

real-time learning needs of the Army presented many future challenges for the Army

training and education establishment, CALL, and organizations across the Army.

Technology

Negative impact of rapidly changing technology. For the most part, technological

advances had benefited CALL (through the DOIM organization) by creating a more

robust and reliable network and system infrastructure. However, many aspects of

technology (software and hardware) that the KM staff had to be familiar with continued

to change at such a pace that it was hard to keep up, especially in light of funding

constraints. Dr. Lackey continued to be very concerned about the continuous migration

issues, and other respondents indicated the need to procure updated software in order to

better serve the customers. Colonel Hiemstra also identified the issue that technology

evolution of hardware and software could ultimately threaten access to previously

archived data stores.

Competition

Competition with other Army organizations was a very real issue to the CALL

staff. Competition for resources, especially funding, was of specific concern, but they

also were aware that they competed with everybody elses' good ideas as well. Due to the nature of their business, CALL was constantly operating outside their niche. In many cases, CALL's intrusion was not well received by other organizations. CALL understood it would have to continue to compete with other organizations for its existence.

Time

Lack of time. Many of the respondents stated in one manner or another that the lack of time has negatively impacted their KM efforts. The lack of time has acted as a barrier to KM in that in today's fast-paced environment there seems to be less and less time to tackle new initiatives, develop new systems, capture individuals' attention about new concepts, and to experiment with new ways of doing business. To add to that frustration, today's customer expectations regarding turnaround times are extremely high. Colonel Hiemstra stated, "…people's expectations about how fast they can get information or how long they are willing to wait for things is changing."

Overall, the CALL case study indicates there are a variety of environmental influence factors that acts as barriers to organization KM. Table 24 below summarizes these influences.

Table 24. Summary of Environmental Influence Findings for CALL

Influence Factor	CALL Findings
GEPSE Climate	• Negative impact of politics • Negative images of KM • Organization structure complications • Negative impact of stove-piped culture • Challenges of changing social expectations • Challenges of changing education expectations
Technology	• Negative impact of rapidly changing technology
Competition	• Competition for resources/existence
Time	• Lack of time

Summary of Influence Factors for CALL

In summary, this chapter has presented the findings from the case study of the Center for Army Lessons Learned. Using Holsapple and Joshi's (2000) framework as a guide, the three classes of influence factors—managerial, resource, and environmental—have been examined. The findings suggest that a variety of influence factors act as barriers to implementing and executing organization knowledge management. Some findings are particularly unique to the military. These findings are compared to five additional case studies.

CHAPTER TEN—ANALYSES AND DISCUSSION

The conceptual framework for this dissertation is based on the work of Holsapple and Joshi (2000; 2002). This framework examines the factors that influence knowledge management in organizations and categorizes them into managerial, resource, environmental influences. The framework, developed using the Delphi method, is considered robust according to a variety of KM experts in both industry and academia. It has not been used, however, to examine such influences in a military environment. For this research, the framework provided a guide to develop research questions and collect data across six military organizations. The following paragraphs provide analyses and discussion of the findings.

The analyses and discussion will address the research questions with respect to the findings across the six case studies. First, a short characterization of each case will provide the necessary context for any case-specific findings. Second, analyses and discussion of the research questions will address each major influence category separately, beginning with the managerial influences, then resource influences, and finally environmental influences. A summary of the findings across all six cases for each influence category will be offered in order to characterize similarities and differences. A discussion of influences found to be unique to the military will also be addressed. Third, findings regarding the spectrum of influences will be used as a basis for a proposed composite model of negative knowledge management influences. Finally,

recommendations for practitioners and researchers will be presented as well as a

discussion of the limitations of this research.

Characterizing the Cases

In accordance with existing literature regarding multiple case study design, the

spectrum of cases investigated in this research were selected for specific similarities and

differences. In order to produce literal replication, all of the cases were military

organizations with recognized KM programs. In order to produce theoretical replication,

the cases were selected from each of the three services equally and all were organizations

with unique missions. Although these criteria remained stable throughout the research,

the unique attributes of each case emerged as the researcher conducted an in-depth

analysis. Table 25 presents a summary table of case type attributes.

Table 25. Case Type Attributes

Organization Name	IT Org.	Non-IT Org.	Business Process Focus	Warfighter/ Tactical Focus	Organization Mission Focus
AFMC		●	●		Oversight of AF systems maintenance/procurement/ Sustainment
AMEDD		●	●	●	Medical
AFOTEC	●		●		Test & Evaluation
MARCOR-SYSCOM	●		●		Headquarters support/field and support equipment and systems
NAVFAC		●	●		Support of shore facilities
CALL		●		●	Lessons learned/knowledge collection and dissemination

A short characterization of each of the cases is described below to provide the context for

these research findings.

Air Force Material Command

Besides the key case attributes of "Air Force organization" and "Material

Command" mission, the AFMC KM organization, AFMC/DRA was unique by pursuing

a KM mission that was ultimately strategic in nature as a non-IT organization located

deep in the organization hierarchy. The contradiction between the relatively narrow

focus of its specific mission within AFMC and the wide range of customers and

initiatives it was supporting (without stated buy-in from command leadership) presented

significant challenges. While lacking the KM culture for implementation, a

preponderance of its KM efforts was centered on building a variety KM systems. Given

that AFMC's KM effort began in earnest during the 1999-2000 timeframe, it can be seen

as a still relatively young and immature program. As a result, the key KM staff expressed

uncertainty about the continuing nature, direction and future of their KM effort.

Army Medical Department

An Army organization with a medical focus, the Army Medical Department

Center and School, Center for Healthcare and Education Studies, Knowledge Services

Branch was unique in the spectrum of cases in that they were truly prepared for the long

haul. Consistently optimistic, each of the KM key staff expressed an understanding of

the barriers to KM and stated they were simply an expected occurrence in the evolution

of KM. Instead of being discouraged by various leadership and resource constraints

(primarily associated with their low position in the Army and Army medical community

hierarchy), the staff consistently negotiated workarounds in order that their KM efforts

could flourish. Although not an IT organization, they built the necessary alliances with

such organizations when necessary. They, too, realized the importance of culture changes in implementing KM, but in the absence of strong influences for change from higher levels, those chose instead to concentrate on promoting culture changes locally while building the KM "system" piece. Recognition as the Best Overall Knowledge Management Initiative for the Army in 2002, combined with the Chief of Staff of the Army's recent endorsement of KM, infused their positive outlook and gave their KM efforts increased promise in the future.

Air Force Operational Test and Evaluation Center

The Air Force Operational Test and Evaluation Center (AFOTEC) case proved to be especially unique in the spectrum of KM cases. In addition to the basic attributes of "Air Force organization" and "test and evaluation mission," the AFOTEC KM effort was unusual for two reasons: 1) the home of the KM program was the AFOTEC IT organization (AFOTEC/SC) and 2) AFOTEC, under the protection of its Title 10 charter, operated as a pseudo-sovereign entity insulated from many external influences experienced by other KM organizations. The situation was very beneficial in allowing the KM staff to operate in a very finite and controlled environment. Because of their defined boundaries, the staff expressed a very clear understanding of the current requirements and future vision of the KM program. Because they were also the IT organization, they had access to the necessary resources and immediate policy support for their KM program. Their dual role as the IT and KM organization also appeared to influence their very system-oriented approach to KM. Finally, because the KM system

had become a command and control mechanism integral to the day-to-day functioning of the command, they had virtually no fears about the future of the KM program.

Marine Corps Systems Command

Given that the U.S. Marine Corps is a Department of the Navy (DON) entity, this case not only offered a unique perspective on KM in the DON, but also on how it is manifested within the Marine Corps. Additionally, the case provided insight into the "Systems Command" mission. Other unique attributes of this case, however, involved the fact that its sponsoring organization was the CIO organization, it had instituted a reward system for reinforcing KM behaviors, its KM effort was steered by a cross-functional team of key leaders from across MARCORSYSCOM, and its KM effort was very young. Again, belonging to the CIO/IT organization appeared beneficial for the KM effort in providing an appropriate functional stovepipe from which to pursue and gain technical and financial resource and policy support. MARCORSYSCOM was also the only case identified as having developed formal reward mechanisms in order to promote KM participation and culture change. The creation of the KM Design Team was another unique approach. The support and involvement of key functional leaders across MARCORSYSCOM lent legitimacy to the effort and helped to establish consilience on objectives and commitment. Finally, despite the fact that the KM effort was little more than a year old, great advances were obvious. The achievements of the MARCORSYSCOM KM team given the lack of resources (manpower, time and money) had been truly remarkable. The impending changes in key leadership, however, made the future of the MARCORSYCOM KM effort uncertain.

Naval Facilities Engineering Command

The Naval Facilities Engineering Command (NAVFAC) case offered another unique insight into KM efforts. In addition to being the second "Navy" case, the facilities engineering perspective was like no other. The NAVFAC case was the only case investigated where the organization, the Chief Engineer's Office (CHENG), saw the KM program as primarily a people-oriented program rather than an IT-oriented program. The community/network of engineers known as E-NET (Engineering Network) had been put in place long before the KM system (also known as E-NET) was developed. Although development of the technical E-NET was deemed important, it was, however, only seen as a tool in facilitating the communication and collaboration between the various engineering communities. The NAVFAC KM effort, however, recognized the real and urgent challenge to stem the brain drain and the need to cultivate the existing cadre of engineers. While these reasons also motivated other organizations' KM efforts, the impact was rarely seen so close to home. The engineering community management efforts, whether they were called KM or not, were critical to NAVFAC's future success and survival. At the time of the case study, the Navy/Marine Corps Internet (NMCI) initiative, which imposed serious funding constraints, and the new Chief Engineer's lack of clarity in supporting KM combined to create an uncertain environment for KM's future.

Center for Army Lessons Learned

The Center for Army Lessons Learned (CALL) provided another unique look at KM efforts in the military service. With its aim of supporting of the tactical warfighter, its orientation was more focused than the general business process focus of the other KM cases. An Army organization committed to the collection, analysis, and dissemination of lessons learned, tactics, techniques and procedures, and research material central to that mission was unique in this sample. Additionally, CALL is a characterized by its KM effort being the focus of the entire organization. Unlike the other cases, where the KM efforts emerged from organizations with larger missions, CALL is an entity unto itself. The CALL organization and mission has evolved over the years—and was the longest ongoing KM-related effort identified in the sample (and probably in the military services). Although CALL's mission has not always been seen in the terms of KM, that evolution is now taking place. CALL is even taking a step beyond KM by using its basic concepts to help the Army transform itself into a knowledge-based, learning organization. It appears that CALL's emphasis is equally split between people-oriented and IT-oriented KM systems. Although technology tools have gotten much attention, such as the CALL Database and the Warrior Knowledge network, the staff remains focused on the initiatives and processes that will help transform the Army into a learning organization. Of all the cases investigated in this research, CALL appears to have the most promise for future success.

Analysis and Discussion of the Research Questions

The following section addresses the four primary research questions with respect to the research results. Each primary question will be discussed by addressing each of the sub-questions in sequence. The questions will be answered by both generalizing across the sample and using case-specific examples where necessary. At the conclusion of each major influence category section, a summary chart that presents general results across the cases and model of the influences will be offered.

Research Question #1—Managerial Influences

The first research question focused on managerial influences that act as barriers to military KM programs. The first general research question (and specific sub-questions) were as follows:

What are the managerial influences that act as barriers to the implementation of KM programs in the U.S. military?

a. *How do leadership commitment and KM reinforcing behaviors from managers at various levels impact KM efforts?*

b. *What coordination issues impact KM efforts?*

c. *What technical, social, and legal control issues impact KM efforts?*

d. *What "measuring" or "valuing" issues impact KM efforts?*

In discussing the results for this research question, the sub-questions will be followed in order.

Leadership Factors

  Lack of leadership commitment. The lack of leadership commitment at critical

levels was found to be the most critical barrier to the implementation of KM in military

organizations. The findings were consistent across all the case studies. Without

leadership support, the proper enabling atmosphere, especially in terms of resources,

could not develop. A precondition for the evolution of KM in each of the six cases was

strong and visionary leadership support at levels immediate to the effort; however, that

same level of leadership support was found to be inconsistent at higher levels of the

organizations. The lack of higher level support appeared to stem from a combined lack

knowledge about KM and/or fear that it was just another faddish management trend.

Some organizations were fortunate to have a more consistent chain of leadership support,

although very few of the organizations reported direct benefits from service-level

leadership support. Both the Navy/Marine Corps and Army organizations recognized the

positive influence of service-level recognition of the importance of and support of KM

efforts, but any direct impact for local organizations, such as resources, had yet to be

seen.

  Lack of reinforcing behaviors. In addition to the lack of leadership at critical

levels, a corollary problem—the lack of reinforcing behaviors—was also identified. The

lack of reinforcing behaviors included the absence of reward systems, the absence of

initiatives to promote culture change, and leaders "talking the talk, but not walking the

walk." Although some organizations, like MARCORSYSCOM, had made efforts to put

reward mechanisms in place, they found it hard to re-model existing reward structures

(for military and civilian) for new purposes. Other organizations recognized the plight of

leaders in having to choose between execution and KM initiatives—execution won out

every time. Only CALL's lessons learned mission was tied to the assessment of

execution-type training activities. Respondents also identified that the short-term

mentality of military leadership, driven in many cases by their relatively quick rotation

between jobs, did not encourage due consideration of long-term objectives such as KM.

AFOTEC was the only organization that did not report the lack of reinforcing behaviors.

The very defined nature of its operation and organization appeared to have insulated it

from many of the negative KM influences. Although AFOTEC recognized the lack of

AF-level conversation and/or policy/guidance regarding KM, it appeared to have little

impact. In deference to what was happening outside the organization, leaders appeared to

be improving their support for KM, as KM programs increased and a "KM-supportive"

culture" was evolving.

     Difficulty in "selling" KM. Respondents from every case who were spearheading

the KM efforts reported the difficulty in selling the idea of KM to leadership and users.

Their difficulties stemmed from two major issues. The first issue involved preconceived

ideas about KM. Some thought KM was a trendy management fad while others thought

it was just another IT project. Trying to address these misconceptions caused the second

major issue: the lack of proper language to describe KM concepts. Without exception,

every respondent, whether on the KM staff or not, noted the difficulty in communicating

with uninformed individuals about KM. KM concepts, and the multi-dimensional aspects

of knowledge sharing, knowledge transfer, and the learning organization, were hard to

describe in terms that individuals understood. Although extensive efforts to educate

leaders and users were carried out, a common, descriptive KM was lacking and,

therefore, concepts were well communicated or understood.

Difficulty in "leading" KM. In addition to difficulties in "selling" KM initiatives,

respondents indicated difficulties in "leading" KM efforts. KM efforts were recognized

as tough tasks because there were no established paths to follow, and no canned solution

for any problem. Given that most of the respondents spearheading KM efforts were self-

taught, since little crossfeed existed between the various military KM efforts, they were

left to make critical choices regarding KM with little or no confidence that they were on

the right track. A majority of the respondents were avid researchers of both the literature

and industry efforts so they did their best to benchmark on successful efforts and apply

what they could to their organizations. AFOTEC did not mention "selling" as a barrier to

KM as it did not seem to be a problem within the confines of AFOTEC.

Coordination Factors

Although coordination issues acted as barriers to KM implementation, one

standout problem had to do with coordinating with IT organizations, particularly when

the KM "home" was not part of an IT organization. The Army and the Navy IT functions

are captured within the CIO organization from the service-level down. The AF-level IT

organization, although under a current reorganization, remains separate from the CIO

function. AF IT functions, not CIO functions, exist in organizations below the service

level. In the sample studied, AFMC and AMEDD were not IT organizations and had not

"conscientiously" decided to work with and adhere to the comparable IT organization

direction and standards. Coordination problems included difficulties in bringing together disparate KM initiatives, difficulties in gaining approval for or implementation of non-standard hardware/software/technical infrastructure, and difficulties in overcoming a very IT-centric view of KM and IT's policy role over KM technology. For NAVFAC, who partnered with the IT organization, the coordination issues were less severe. Although the MARCORSYSCOM KM "home" was the headquarters IT organization, they still identified coordination problems with the service-level IT systems provider. Another related problem derived from the paradigms held by leadership about the IT organization. Because the technology piece was critical to KM efforts, there was an immediate, and often faulty, assumption that it should or would be the responsibility of the IT organization. As a result, clear lines of tasking and authority were muddied often to the dismay of both the IT and KM organization (unless they were the same organization).

Executive steering committee needed. Another important coordination issue cited by respondents was the need for executive committees to steer/negotiate KM effort. The necessity for such governing bodies was driven primarily by the intra-organizational nature of most KM efforts. The lack of such committees made coordinating the realm of issues that crossed established organization boundaries extremely difficult, if not impossible. Although the need for oversight committees was recognized by every organization, only a few had managed to put any formal mechanisms in place.

Difficulty in coordinating between information/knowledge owners. For those organizations that had built KM systems, most reported difficulties in coordinating and receiving participation from various information or knowledge owners. This was

especially difficult in the absence of any steering bodies. The old adage "knowledge is

power" seemed to apply in many cases, and organizations/individuals were hesitant to

give up their information. Organizations such as AFOTEC and MARCORSYSCOM

had, however, made great headway in breaking down the functional information

stovepipes. Their success was attributed to strong leadership support and active/involved

governing bodies.

Lack of crossfeed. The last significant issue of coordination identified was the

general lack of crossfeed between organizations/individuals involved in KM efforts.

Although only mentioned specifically by two organizations as a barrier to KM

implementation, the researcher identified many instances where the lack of crossfeed

(between organizations/individuals involved in KM, between like organizations, and even

between similar organizations across the services) hindered knowledge discovery and the

evolution of KM across the board. The lack of crossfeed and mechanisms that promoted

such crossfeed also contributed to duplication of effort (such as similar KM/IT systems)

and prevented opportunities for economies of scale. Many of the respondents described

their personal efforts to establish crossfeed, but their efforts had been limited by time and

money. The lack of crossfeed also contributed to difficulties in getting the word out to

potential customers/beneficiaries.

Control Factors

Restrictive impact of external control policies. Across the cases, a host of control

issues were identified as barriers to knowledge management. The first major category of

control issues involved the restrictive impact of a variety of external policies. In general

these policies, which will be addressed next, directly or indirectly impacted the KM

staffs' ability to develop and deploy KM systems and/or other non-technical KM

initiatives. Generally the restrictive policies involved:

- Technical infrastructure standards

- Software standards and policies for procurement and use

- Format standards

- Service-level IT plans/initiatives

- Legal issues

Technical infrastructure standards were reported to have impacted KM efforts more

in years past than recently. This situation appeared to be due, in part, to the fact that

technical infrastructure and policies for governing that infrastructure had stabilized over

the past few years. Most of the cases reported struggles early on regarding server

ownership, connectivity solutions, and maintenance issues, but most of those issues had

been resolved. Most of the KM systems now used the IT technical infrastructure (i.e. the

base/post communication backbone, Internet connectivity, etc.) as a utility. Only

AFOTEC continued to experience problems with the continued pressure to merge its

technical infrastructure with that of the owning base (local IT organization) in the spirit

of "one command, one network."

Despite the fact that all the cases recognized the basic necessity for IT organization-

driven software standards and policies for procurement and use, they found that such

policies were often unnecessarily restrictive and/or insufficient to cover the KM

phenomena. From being forced (or having no choice due to lack of funds or the desire

for cooperation) to use pre-selected KM software (which in many case was done so based on price versus utility) to having to use older, outdated, or inappropriate versions of database, search engine, web development software, etc., the respondents continued to run into roadblocks. In some cases where they did find appropriate software for their purposes and had the funds to purchase, they were not allowed to proceed it because it was not on the accepted standards list (which more often that not did not include many KM/collaboration software products anyway). Such restrictions limited the ability to experiment with new technologies that might facilitate KM developments.

Another restrictive control policy identified at NAVFAC was the mandatory compliance with the CIO's office standard format for web page development. Although the need for a standard "look and feel' was recognized, it had not given the KM staff much flexibility to be creative or develop non-standard applications.

The controls set in place as a result of the Navy/Marine Corps Internet initiative, although unintended, were causing major impediments to KM initiatives in the Navy and Marine Corps. Although intended to be a technically focused initiative, NMCI was draining financial and manpower resources from organizations across the board. Both the Navy and Marine Corps initiatives had funding and manpower cuts that many respondents felt might jeopardize the survival of their KM programs. The lack of explicit implementation guidelines delayed critical decisions such as the continuation of contractor supported software development, IT staff manning level, purchase of software, etc. NMCI had, in most respects, put KM efforts in the Navy and Marine Corps cases on indefinite hold. CALL also reported the negative impact of a high-level IT plan, called

the CTC Master Plan. Although no longer a concern, it is worth noting that, much like

NMCI, this plan had very IT-oriented objectives. The outcome, however, almost put

CALL out of business.

A variety of legal controls were also mentioned as being barriers to KM. These legal

controls included Federal laws that govern the Privacy Act, the Freedom of Information

Act (FOIA), Section 508 compliance, and records management and service laws that

govern For Official Use Only (FOUO) information. Again, although the basic necessity

of these laws was recognized, many of them were problematic when it came to building

KM systems. Legal requirements were seen as barriers to meeting the knowledge sharing

goals of KM since so many rules and regulations controlled much of the KM

development activities. Many of the respondents who were responsible for building and

implementing the technical KM systems reported that complying with the laws was very

frustrating because 1) they had to be extremely cautious about what information was

made available over the systems 2) compliance with such laws (i.e. Section 508, FOIA)

was extremely time consuming and 3) some laws (i.e. records management) had not

evolved to the point necessary to be very helpful in practical application.

Lack of internal controls. As each of the case study KM efforts and technical

systems began to evolve, there was a realization that the lack of internal controls or

policies hampered future growth. Respondents recognized the need for policies that

addressed sub-site management, content and quality management, taxonomies, and steps

to culture evolution. Because many of the KM systems acted as portals to other sources

of information/knowledge, policies that established the responsibilities and requirements

of sub-site managers and the content and format of sub-site information became increasingly necessary. The exponential growth of information contained within (and made available through) the KM systems also made the issues of content and quality management of serious concern. Content and quality issues ranged from accuracy and currency of information to ownership issues. The need for taxonomies, especially enterprise-wide taxonomies, on which to organize the ever-growing volumes of information, was another critical issue that consistently hampered progress. Finally, some of the cases with more mature KM efforts had identified the need for policies regarding the steps to various facets of KM cultural evolution. It was stated that, although everyone understood how important it was to change the organization culture to be more KM-oriented, no one knew exactly how to make that happen. Overall, the lack of control policies thwarted KM efforts by requiring the focus of KM staff and allowing inconsistent and wasteful approaches in some aspects of KM system development.

Difficulty controlling "outside" contractors. Two cases revealed impediments to KM that had resulted from difficulties in controlling "outside" contractors. Although every case studied made use of contractors in some respect, most of them worked "in-house" alongside the KM team/staff. Reported difficulties involved experiences with contractors who were not part of daily operations. The impression in both cases was that these contractors had possibly taken advantage of the KM staff's initial lack of knowledge about KM. In so doing, they "charged them lots of money for little return." In the first case, the organization dissolved the relationship, while in the second case, the relationship continued, though very cautiously.

Negative impact of social control. The instances of social control were in most cases a positive influence on the KM efforts. Many KM leaders had taken positive steps to ensure the staff composition included the desired knowledge and skill. The grade and qualification restrictions associated with civilian and military positions were, however, unintended negative consequences of social control which, in some cases, restricted the hiring of individuals who were properly qualified for KM-related positions. Negative social control in the form of forced culture changes (i.e. making individuals use the KM systems or basing performance judgements on the level of KM system usage) was also identified.

Measurement Factors

Measurements/value needed to gain/keep leadership support. Except for AFOTEC, all of the cases reported that "measurements" or "proof of value" was needed to gain (or keep) leadership support. Although there was no instance of leadership demanding proof of value, respondents feared that if they could not provide good news that leadership support would decline. In fact, some respondents reported that if they had not been able to show proof of concept initially, that they would have never been able to convince leadership of KM's potential value. For the most part, KM systems that served a variety of needs provided the initial proof that KM staff used to convince leadership.

Lack of adequate measures. A major barrier to providing leadership with tangible results regarding the impact of KM and KM systems was the lack of adequate measures. Recognized as a serious problem in every case studied, the lack of metrics was a continuous concern. Although many of the cases used KM system (or website) usage

statistics to demonstrate activity, both customers and leaders stated that such statistics

were suspect. As a result, organizations had relied on qualitative stories of success until

they had a better idea of how to quantitatively prove KM's value.

Measurements detrimental to culture change. Instances were cited where the use

of metrics, specifically tracking KM website/utility usage, were considered damaging to

the culture change toward KM. First, individuals and leaders were often suspect of

website use statistics—they did not think they captured the true picture of the how's and

why's of usage. Secondly, the use of metrics to track users' contributions to KM systems

was not seen as a positive influence in promoting participation in KM programs.

Overall, the managerial influences of leadership, coordination, control, and

measurement have been shown to create barriers to KM implementation in U.S. military

organizations. While findings were varied among the six cases this discussion presented

the only major themes. Although the findings in this category revealed influences with a

distinctive military flavor, the core influences are consistent with what has been

presented in the literature.

Summary Chart of Managerial Influence Findings

The managerial influences, across the six cases, that act as serious barriers to

implementing KM in military organizations are summarized in Table 26.

Table 26. Summary of Managerial Influence Findings

		AFMC	AMEDD	AFOTEC	MCSYSCOM	NAVFAC	CALL
Leadership	• Lack of leadership commitment	•	•	•	•	•	•
	• Lack of reinforcing behaviors	•	•		•	•	•
	• Difficult to "sell" KM	•	•	•	•	•	•
	• Difficult to "lead" KM	•	•		•	•	•
Coordination	• Conflict w/IT organization	•	•		•		•
	• Executive steering committee needed	•	•	•	•	•	•
	• Difficult to coord. between info/knowledge "owners"			•		•	•
	• Lack of crossfeed				•	•	•
Control	• Restrictive impact external control policies	•	•	•	•	•	•
	• Lack of internal controls	•	•	•	•	•	•
	• Difficulty controlling contractors	•	•				
	• Negative impact of social control		•		•		
Measurement							
	• Measurements/value needed to gain/keep leadership support	•	•		•	•	•
	• Lack of adequate measurements	•	•	•	•	•	•
	• Measurements detrimental to culture change		•		•		

Research Question #2—Resource Influences

The second research question focused on resource influences that act as barriers to military KM programs. The second general research question (and related sub-questions) were as follows:

What are the resource influences that act as barriers to the implementation of KM programs in the U.S. military?

a. How do financial resource issues impact KM efforts?

b. How do human resource issues impact KM efforts?

c. How do material resource issues impact KM efforts?

d. How do knowledge resource issues impact KM efforts?

 In discussing the results of this research question, the sub-questions will be followed in order.

Financial Resource Factors

Without exception, every case noted the lack of funding as a major barrier to implementing KM. While AFOTEC appeared to be more insulated from financial woes, the staff still described funding shortfalls. The restrictive military funding environment was inflexible, required long lead times, and followed a very stovepiped funding approach that made it difficult to submit for and receive funds. KM activities were inevitably perceived as belonging to no particular niche making funding support through established functional stovepipes (such as IT) an essential option for survival. For non-IT organizations, funding usually came from miscellaneous funds procured by supportive leadership.

Human Resource Factors

Lack of manpower availability. The shortage of manpower was another major barrier to KM that was addressed in all the case studies. Although CALL and NAVFAC did not readily indicate manpower shortages in their immediate KM staff, it was a considerable problem for other sites. Although lack of funding caused some of the shortfalls, it was again the "out of-hide" nature of most of the KM efforts that kept resources tight and kept leaders from committing more manpower. The other manpower shortage issue was the lack of manpower to implement, experiment, or even train external organizations about the KM program. Respondents provided overwhelming testimony

regarding the overworked condition of potential beneficiaries/users in the field that suggested the futility of KM efforts unless the leadership focus changed.

Lack of KM knowledge, expertise, and skill. The lack of the appropriate KM knowledge, expertise, and skill was identified as barrier by all the cases. Although the responses tended to concentrate on the attributes needed by the immediate KM staff, they were also extended to the recipient population. Respondents noted that KM staff members had gained knowledge about KM through their own efforts or by working with KM concepts over time. Finding KM-literate individuals in the general military population to staff the KM function was quite rare. AFOTEC referenced the need to provide training to KM system users because they lacked the knowledge, skill, or perhaps motivation/time to learn on their own.

Negative impact of turnover. The negative impact of both civilian and military turnover was recognized across the board. Although military turnover was an accepted part of the military culture, the consequences of short-term leadership with the resulting need to constantly re-train and re-sell new staff members and leaders on KM was a chronic problem. Slower turnover amongst civilian employees often provided program stability. However, the impending mass retirement of many civilian employees was a stated driver behind many of the KM efforts and tended to add a sense of urgency to the development of more people-oriented KM "systems" such as mentoring programs and communities of practice.

Lack of outsourced personnel commitment. Although only mentioned in the AFMC case, the lack of outsourced personnel commitment to the success of KM efforts

warrants mentioning, given the continuing pressure to outsource military functions. This

issue was raised in response to inquiries about the vested interests of the many members

of the KM staff to show results, compared to the contractors' desire to charge "a lot of

money for a little product." The contractor's commitment to deliver valuable KM

products to ensure the future success of the KM efforts appeared questionable. In a

related issue, the practice of outsourcing core KM competencies was seen as dangerous,

costly, and potentially threatening to the longevity of any organization KM program.

Material Resource Factors

Technical infrastructure challenges. Technical infrastructure was cited as a

significant challenge to KM efforts in past years more than present. Although several

cases reported technical infrastructure struggles with existing IT organizations, most

cases viewed the infrastructure as the utility on which their KM systems relied. Some

organizations, however, were still confronted with hard decisions regarding the evolution

to new computing platforms, and AFOTEC was faced with unique infrastructure

decisions that addressed its geographically dispersed and high-security nature.

Lack of KM hardware/software choices. Because of limited resources and

imposed "standards" for software (and sometimes hardware) by the IT organization, all

the cases, except AFOTEC, reported a lack of appropriate tools to support/build KM

technical systems. Most of the free software provided by the IT organizations had

limited capabilities and was cited as inadequate by KM users. To make matters worse, as

emphasized in the AFMC case, IT organizations were making determinations about KM

software standards without really understanding the concepts behind KM or
understanding the true needs of the KM users.

Existing systems inadequate. A majority of respondents reported dissatisfaction
with their existing KM systems. This dissatisfaction primarily stemmed from the fact
that existing KM software/applications were not very user-friendly or intuitive. Attempts
to improve the software/applications were often stymied due to the lack of funding for
new software, the absence of better software from the approved standards list, or due to
available software simply not yet serving as a seamless part of the KM users' everyday
work habits. Respondents across the board recognized that until KM systems became
transparent to everyday users, that their support and use would continue to be lackluster.

Challenges of technology evolution. The rapid changes in technology were
recognized as a constant source of difficulty for many of the KM staffs. Not only did
technology changes precipitate the need for new hardware and software purchases (for
which there were very few funds), but it also required consistent re-strategizing about the
most appropriate technology solutions and migration paths. Because technology
solutions were constantly moving targets, the KM staffs were concerned that new
technology might obsolete their chosen courses of action.

Inadequate facilities. One of CALL's major challenges had been the lack of
adequate physical facilities to store documents. Due to its incredibly large archiving
effort, the KM staff needed a large amount of environmentally-controlled space. Instead
of spending valuable time concentrating on and implementing their KM–related

programs, key KM staff members were required to participate in countless negotiations for building space and spend time recovering the space once they finally received it.

Knowledge Resource Factors

Lack of tacit knowledge capture. Despite the recognition in all cases of the importance of tacit knowledge capture, many KM staffs were still mired in the challenges associated with explicit knowledge capture. CALL and AFOTEC, who had more mature KM efforts, were making progress on tacit knowledge capture (and transfer) efforts, but their exact path was yet undetermined. From an enterprise perspective, the continuing lack of tacit knowledge capture was an issue of growing importance. As time passed more civilians were retiring and military staffs were shrinking—with a resulting loss of critical intellectual capital becoming more obvious and visible.

Lack of "knowledge about knowledge management." The "lack of knowledge about knowledge management" was pervasive throughout all branches and levels of the services. With the exception of key KM leaders, some KM staff, and various KM enthusiasts, general knowledge about KM across the services was virtually non-existent. This finding was surprising given that the Navy has implemented a very robust KM education and training program, and that the Army is in the early stages of doing the same. Another surprising juxtaposition was the fact that AFOTEC did not cite major concern about the "lack of knowledge about knowledge management." AFOTEC respondents admitted that not everyone knew about or understood KM, but AFOTEC's knowledge of KM and how KM could be applied to improve its mission was more diffused than was witnessed in other organizations. Again, it appeared that the very tight-

knit and controlled nature of the organization lent itself to a more efficient process of spreading the word.

Lack of knowledge about organization KM strategy. With the exception of AFOTEC and CALL, the other cases reported a general lack of knowledge about the organizational KM strategy and/or the future of the KM strategy. Outside of the immediate KM staff and key KM leaders, it was often found that personnel at other levels of the organizations were unaware of any KM strategy and, if aware, they most likely had no idea of what direction the organization was headed. This provided a major barrier in coordinating efforts toward a common goal of KM. Also, with the exception of AFOTEC and CALL, respondents were generally unsure about the future of their KM efforts. The uncertainty stemmed from the continually dwindling stream of resources and the continuing uncertainty of leadership support in light of significant personnel turnovers.

Incompatible/Inaccessible information/knowledge stores. A majority of the cases reported difficulty in accessing existing information/knowledge stores when trying to incorporate them into the KM systems. Most of the problems stemmed from incompatible data trapped in legacy systems, although individuals or organizations also refused to release or contribute information/knowledge to the KM systems.

Lack of knowledge about a KM-supportive culture. Every case argued for the development and evolution of an organization culture that encouraged knowledge-sharing and was based on knowledge management concepts. Unfortunately, respondents did not know exactly how to make that happen. Cultural changes needed to originate at the

service level and higher. Without service-level initiatives, and perhaps DoD level, efforts

to precipitate changes to the organization culture, local efforts could only have a minimal

impact.

Overall, certain aspects of financial, human, material, and knowledge resource

influences have acted as barriers to KM implementation in U.S. military organizations.

Although the findings identified variations among the six cases, the responses were

remarkably consistent throughout the sites. As compared to existing literature regarding

the private sector, the influences which can be seen as unique to the military include the

restrictive budgeting environment, culture-induced turnover, and lack of KM software

and the inadequacy of systems due to various control policies. Although the remaining

resource influences described exhibit a distinctive military flavor, they are consistent with

experiences previously reported in the literate.

Summary Chart of Resource Influence Findings

The previous paragraphs have provided a generalized summary of the resource influences

that act as barriers to implementing KM in military organizations. Table 27 presents a

summary of these findings across the six cases.

Table 27. Summary of Resource Influence Findings

		AFMC	AMEDD	AFOTEC	MC SYSCOM	NAVFAC	CALL
Financial	• Lack of adequate funding	•	•	•	•	•	•
	• Restrictive budgeting environment	•	•		•	•	•
Human	• Lack of manpower availability	•	•	•	•	•	•
	• Lack of KM knowledge, skills, and expertise	•	•	•	•	•	•
	• Negative impact of turnover		•	•	•	•	•
	• Lack of "outsourced" personnel commitment	•	•				
Material	• Technical infrastructure challenges		•	•		•	•
	• Lack of KM hardware/software choices	•	•		•	•	•
	• Existing KM systems inadequate	•			•	•	•
	• Challenges of technology evolution	•	•	•			•
	• Inadequate facilities						•
Knowledge	• Lack of tacit knowledge capture	•	•	•	•	•	•
	• Lack of "knowledge about KM"	•	•		•	•	•
	• Lack of knowledge about KM organization strategy	•	•		•	•	
	• Incompatible/Inaccessible information/knowledge stores		•	•	•	•	•
	• Lack of knowledge about KM-supportive culture	•	•	•	•	•	•

Research Question #3—Environmental Influences

The third research question focused on environmental influences that act as

barriers to military KM programs. The environmental influence category, according to

Holsapple and Joshi, identifies of influences external to the sample organization(s). Due

the large size of the military services, environmental influences for any specific

organization were defined as both those external to the immediate organization (yet still

within the service) and those external to the service itself. The third research question

(and specific sub-questions) were as follows:

What are the environmental influences that act as barriers to the implementation of KM programs in the U.S. military?

a. *How do governmental, economic, political, social, and educational (GEPSE) climate issues impact KM efforts?*

b. *How does technology (external to the military) impact KM efforts?*

c. *How have past military of industry KM strategies and results impacted current KM efforts and strategies?*

d. *How does "time" impact KM efforts?*

In discussing the results for this research question, the sub-questions will be followed in sequence.

GEPSE Climate Factors

　　Negative impact of politics. The negative impact of politics was reported in every case. Although political conditions external to the military were recognized drivers of local conditions, they were still perceived as far removed. Local organization and service politics were reported much more frequently. A sampling of findings included battles between vested interests, the necessity of being politically correct, priorities and projects based on leadership whims, and power plays associated with organization structure and hierarchy. A number of respondents commented on the exceptionally bureaucratic nature of the services.

　　Increased security climate. According to respondents, network and information security issues had been a constant concern of the military. KM staffs had to be excessively vigilant about how and what they were making available over their Internet-

based systems. September 11th events heightened security awareness and also drove some basic changes to existing KM systems.

Negative images of KM. The negative images of KM as portrayed through the media and as a result of failed claims of consultants continued to work against KM staffs in their efforts to educate both leaders and users. The impression by many that KM was just another management fad made it hard for KM staffs to spread the word.

Organization structure implications. Due to the very hierarchical nature of the military, the role of "place" in the organization structure had great impact on the level of success achieved by the KM staffs/leaders. To be located "low" in the organization hierarchy or to be a non-IT organization, presented barriers in implementing KM. In addition to the lack of power, resources, and exposure at these lower levels, AFMC, AMEDD, NAVFAC, and CALL found it hard to implement the necessary strategic KM applications that served communities outside their own organization boundaries.

Negative impact of stove-piped culture. The negative impact of functional stovepipes on business process, resource allocation, and requirements determination was seen as a major barrier to implementing KM. Even for those organizations that were cognizant of the stovepipes and made efforts to work around them, the challenges were still great. Since many of the stovepipes, especially those relating to funding issues, are seated in public law makes the problem even more complex. Given that knowledge management requires the crossing, or even dissolution, of organization boundaries to facilitate knowledge transfer, the existence "of" and operations based "on" functional stovepipes threatens any KM effort at its very core.

Social/education expectations. As reported either directly or indirectly in many of the cases, the social expectations (education expectations are included here) of the general user/customer populations continue to increase. Overall, it was reported that users/customers expect improved technology (hardware and software), level of service, and timeliness of service/response. Due to the lack of financial and human resources, KM staffs were unable to respond quickly with improved products and services.

Impact of outsourcing. Although only two sites reported a less than stellar experience with outsourcing, the pressures for outsourcing and the need to procure KM knowledge, skills, and expertise from external sources made it an issue of importance. Every case made use of contractors (primarily in-house contractors) to complete their KM team. The pressure to outsource and the need to incorporate external sources of KM expertise perpetuated a continual loss of internal core competencies. Due to the lack of KM expertise, AFMC and AMEDD had to rely on contractors which proved to be less than successful.

Technology Factors

Adverse impact of KM vendor/technology proliferation. Many of the respondents noted frustration with the proliferation of KM vendors and technologies touted as KM solutions. Their frustration centered around the lack of consensus about the best solutions combined with the fact that they were left to make the risky decisions on their own (when funds allowed). The proliferation of vendors (which target government business) was also annoying due to the fact that many were selling KM products which were actually information management products in "sheep's clothing."

Negative impact of rapidly changing technology. Many respondents reported the negative impact of rapidly changing technology. Besides potentially obsoleting or requiring changes to their chosen KM technology solutions, technical changes also kept customer and leaders anxiously looking for the next best thing. The ability to stabilize technical solutions for any extended period of time was almost impossible unless forced by the lack of resources.

Increasing expectations of customers. As noted above, customers had increasing expectations in all aspects of technology. The KM staffs understood this, though their hands were often tied to do anything about it. This appears to have driven KM staff into building applications with software that was pre-determined as inadequate in the belief that it was better to do something than nothing. This, however, led to a high incidence of customer (and KM staff) dissatisfaction with systems, which discouraged its subsequent use.

Competition Factors

Limited crossfeed between services. While respondents noted a lack of intra/inter-organizational communication, the researcher also observed the lack of crossfeed between individuals, organizations, and the services. The lack of established mechanisms to promote crossfeed left many respondents feeling if they were the only ones experiencing problems. Such isolation also left them without the benefit of learning from others who had experienced similar situations. For example, the researcher found that two sites had built nearly identical components for their KM systems unaware of each other's KM efforts. To their credit, many of the respondents had established crossfeed and had

benchmarked with other organizations according to the limits of their money and time. The Navy and Army also sponsored annual knowledge symposiums to spread the word, even though many respondents were limited in participation due to time and money constraints.

Negative impact of private sector trends. One very high-ranking respondent noted (which was confirmed with other respondents) that the military was often swayed by private sector trends. The resulting problem occurs when the military follows blindly in the footsteps of the private sector without evaluating private sector outcomes. In KM, it appeared to the researcher that the military may have to find its own unique answers.

Competition between organizations. None of the respondents were cognizant of any perceived or actual competition between the services with respect to KM. Surprisingly, few organizations were cognizant of what other organizations or services were doing with respect to KM. CALL was the only organization that reported a keen awareness of their need to compete with other Army organizations for resources and ideas.

Time Factors

Lack of time. Every respondent reported the lack of time to complete their required tasks. For many respondents involved in KM, the KM effort was not their only job responsibility. The lack of human resources and the lack of funding meant near-term solutions were unlikely. Leaders and users/customers where also overwhelmed with their own execution-oriented duties. Until "taking time-out" for KM becomes an organization priority, improvements will be slow.

Overall, environmental influences have acted as barriers to KM implementation in U.S. military organizations. Although the findings identified variations among the six cases, the responses were remarkably consistent throughout. As compared to existing literature regarding the private sector, the influences unique to the military include the heightened impact of politics, the implications of organization structure, and the impact of the stovepiped culture. While other environmental influences exhibit a distinctive military flavor, they are consistent with experiences previously reported in the literate.

Summary Chart of Environmental Resource Influence Findings

The previous paragraphs have provided a generalized summary of the environmental influences that act as barriers to implementing KM in military organizations. Table 28 presents a summary of these findings across the six cases.

Table 28. Summary of Environmental Influence Findings

		AFMC	AMEDD	AFOTEC	MC SYSCOM	NAVFAC	CALL
GEPSE Climate	•Negative impact of politics	•	•	•	•	•	•
	•Increased security climate		•	•	•	•	•
	•Negative images of KM	•	•	•	•	•	•
	•Org, structure implications	•	•				•
	•Negative impact of "stove-piped" culture	•	•		•	•	•
	•Increasing social/education expectations	•	•	•	•		•
	•Negative impact of outsourcing	•	•				
Technology	•Adverse impact of proliferation of KM vendors/products	•	•		•		
	•Negative impact of rapidly changing technology	•	•	•			•
	•Increasing expectation of customers	•	•	•		•	•
Competition	•Limited crossfeed between organizations/services	•	•		•	•	•
	•Negative impact of private sector trends					•	
	•Competition between organizations						•
Time	•Lack of time	•	•	•	•	•	•

Research Question #4—Impact of Influences on KM Implementation

The fourth research question focused on how influences act as barriers to KM implementation in the military. The question stated:

How do managerial, resource, and environmental influences impact KM implementation in military organizations?

Discussion of Impact of Influences

In addition to the range of specific influences that act as barriers to KM in the U.S. military, combined interaction also creates "systems" barriers to KM implementation in military organizations. Due to the intertwined and confounding nature

of all the influences, limitless combinations could be explored. This research, however,

offers one model to depict the process of managerial influences and one model to depict

the process of resource influences. Environmental influences impact the managerial and

resource models indirectly.

Models of KM Influences

  Managerial Influences Model. The managerial influences model shown in Figure

85 shows the linkages between the major categories of managerial influences. The model

provides a conceptual depiction of how major negative managerial influences (combined

with the appropriate environmental influences) work together to thwart the evolution and

progress of KM.

Managerial Influences Model
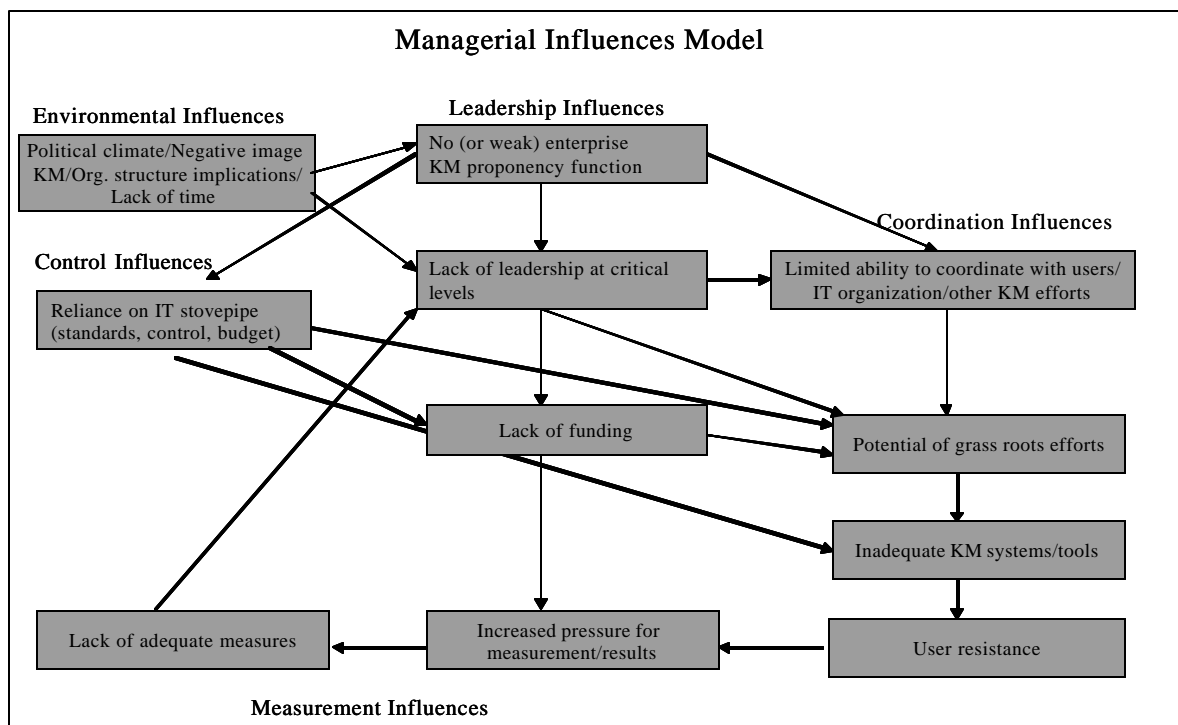
Figure 85. Managerial Influences Model

Resource Influences Model. The resource influences model shown in Figure 86 shows the

linkages between the major categories of resource influences. Again, the model provides

a conceptual depiction of how major negative resource influences (combined with the

appropriate environmental influences) work together to thwart the evolution and progress

of KM. Next to leadership, lack of funding was the most critical negative resource

influence. Without strong leadership first, funding does not usually follow. Without

funding, manpower/time become constraints, staffs/customers become dissatisfied, and a

general pessimism about KM develops and discourages acceptance and participation.
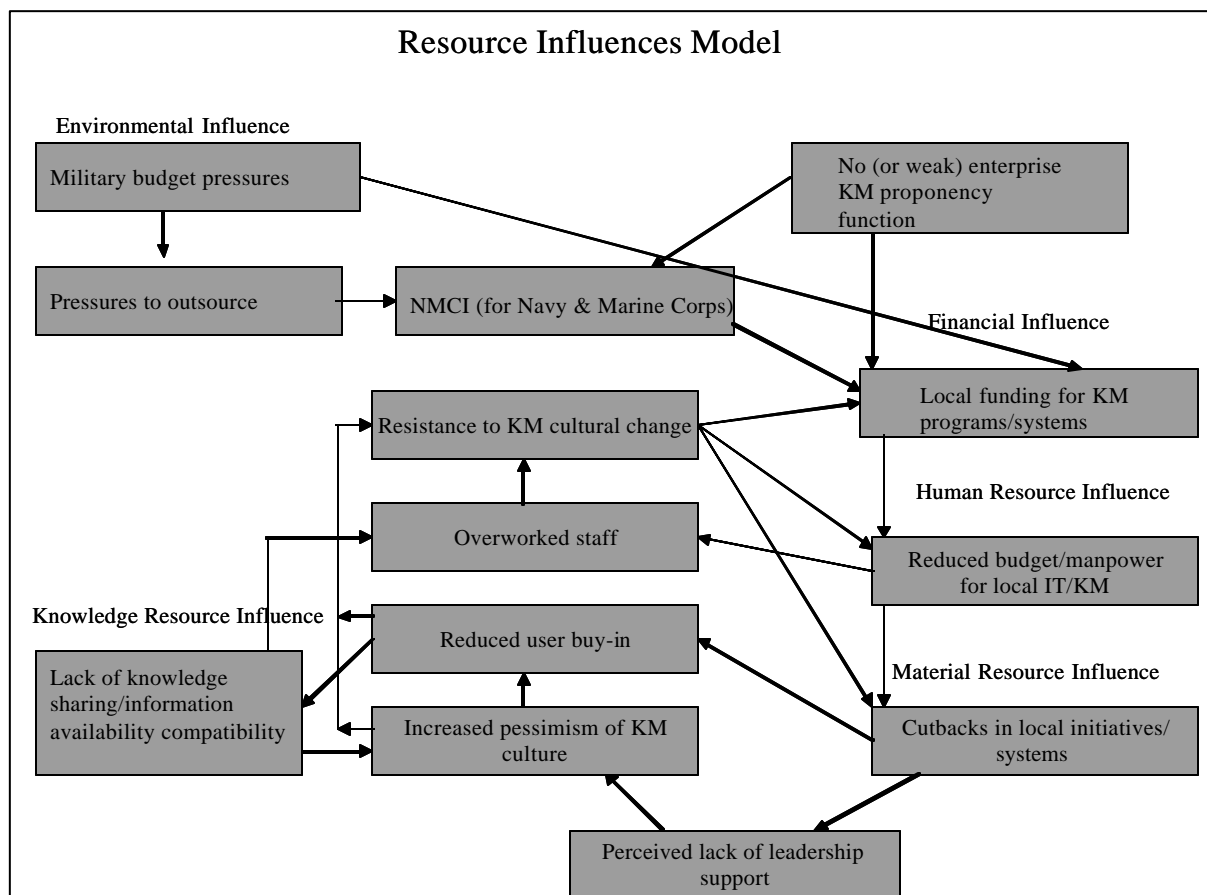
Figure 86. Resource Influences Model

Summary of Analyses and Discussion

This chapter has provided a discussion of the research questions against the findings. Further analysis of the findings also led to the development of the Managerial and Resource Influence models. Overall, the research has shown that a broad range of negative influences link together to form "systems" which together act as barriers implementing KM in U.S. military organizations.

CHAPTER ELEVEN—CONCLUSIONS AND IMPLICATIONS

This dissertation has focused on the identification of influence factors that act as barriers to implementing knowledge management (KM) in U.S. military organizations. The research has identified a wide range of negative managerial, resource, and environmental influence factors, some of which have been identified as unique to the military. The identification of these influence factors has also allowed the development of two process models, a managerial influence and resource influence model, which depict how the negative influences work together to thwart KM.

The rationale for doing this research was to investigate barriers to knowledge management in a military context. Specifically, the four research questions that were explored and examined in this dissertation research were:

1) What are the managerial influences that act as barriers to the implementation of KM programs in the U.S. military?

2) What are the resource influences that act as barriers to the implementation of KM programs in the U.S. military?

3) What are the managerial influences that act as barriers to the implementation of KM programs in the U.S. military?

4) How do managerial, resource, and environmental influences impact KM program implementation in U.S. military organizations?

The investigation was conducted using case study methodology. Six military organizations, two from each of the three services, each with a different organization mission were studied and analyzed. Semi-structured interviews with KM program key staff and leaders from each organization were conducted using the research questions as a guide. This information was augmented with additional material gathered from organization archives, websites, policy papers, etc. so that a complete picture of the organization KM effort could be provided. Individually, each organization was written up as a research case study, and collectively a summary of influence factors was provided as well as two influence process models.

Conclusion

In addition to answering the specific research questions of this dissertation, conclusions can be drawn regarding the general process of implementing KM (or what is called KM) in military organizations. In conducting the research, the researcher observed a general pattern in how the varied and unclear concepts of KM are brought to organizations, how they are subsequently "sold" to the leadership, and how organizations struggle to implement them. The pattern was repeated from case to case, almost without exception. It was found that a range of negative influences played a key role, but some were especially damaging in the process of trying to implement KM. In order to describe this process and the associated negative influences, the following explanation is offered.

Confusion in the Terminology/Concepts

Before describing a process model of KM influences, a clarification of terms and concepts associated with the KM phenomena must be offered. From the researcher's observation, it appears that organizations are not really struggling with KM per se. Instead, they are struggling with a bigger concept of how to capture, manage, and use the organization/individual information and knowledge in real time in order to leverage decision-making and effectiveness. If we are to add clarity to the terminology, the organizations are experiencing an "emergent learning phenomenon" which requires they become learning organizations. Although this research has not extensively addressed the concepts of emergent learning or the learning organization, the researcher has discovered that KM is actually an element of these higher-order phenomena. This research has repeatedly identified the confusion--the lack of descriptive KM language and the lack of concise KM definitions. In the findings of the researcher, the generally used term and concept of "KM" does not adequately encompass the spectrum of issues involved. Knowledge management is not just about the systems for managing knowledge. It requires that effective knowledge capture technologies and systems be developed, and that effective distribution of the knowledge be facilitated through the IT infrastructure. This research finds that organizations have understandably confused the need for what they understand as knowledge management and the true need for organization learning through effective transfer systems. Knowledge transfer (KT) requires knowledge capture (KC), knowledge management (KM), and knowledge distribution (IT). These

subsystems require separate approaches and technologies which must be effectively integrated to achieve the KT necessary for learning organizations.

The new urgency for the development of learning organizations is closely associated with the fact that organizations are struggling with new ways to learn in the face of a rapidly changing environment. When the pace of change in our society was slower, the traditional forms of training and education worked well for organizations. Time was available for new changes to be incorporated into the training and educational curricula and on-the-job (OJT) training programs and for workers to learn how to conduct tasks in the classroom and transfer their experiences back to the workplace. But, in today's fast-moving world, although traditional forms of training and education still have their place, most workers are having to learn as-they-go and from each other in real time. This new form of learning has been referred to as "a dynamic spiral" of learning (Nonaka and Takeuchi, 1995, p.44) Given that organizations don't have time to re-create and establish training programs for new knowledge, it has become increasingly important to rapidly capture the knowledge of individual workers and to make it sharable across the organization.

For organizations and individuals struggling with conceptualizing the new emergent learning phenomena and also trying to take action to deal with it, this research indicates that there are actually four key components of the problem/solution. Understanding these basic components is essential to sorting out the existing confusion in KM. These four key components begin with the information technology (IT) that generates the digital capabilities of the organization, information/knowledge management

(IM/KM) capabilities that allow for effective access and communication, and knowledge

capture (KC) which is required to extract knowledge from individuals. These three

components are required for the final component, effective knowledge transfer (KT), to

occur. With respect to building a learning organization, IT provides the infrastructure

that allows for data storage, access, and communication. In doing so, it also provides the

tools to build systems that help facilitate information/knowledge management and

knowledge capture. IM and KM have to do with the organizing and controlling processes

that must be put in place so that information/knowledge can be logically collected, stored,

retrieved, and archived. KC focuses on tacit knowledge capture—how to get information

and experience out of individuals' heads. Finally, KT becomes the primary goal of

learning organizations and functions as the umbrella goal for structuring its three key

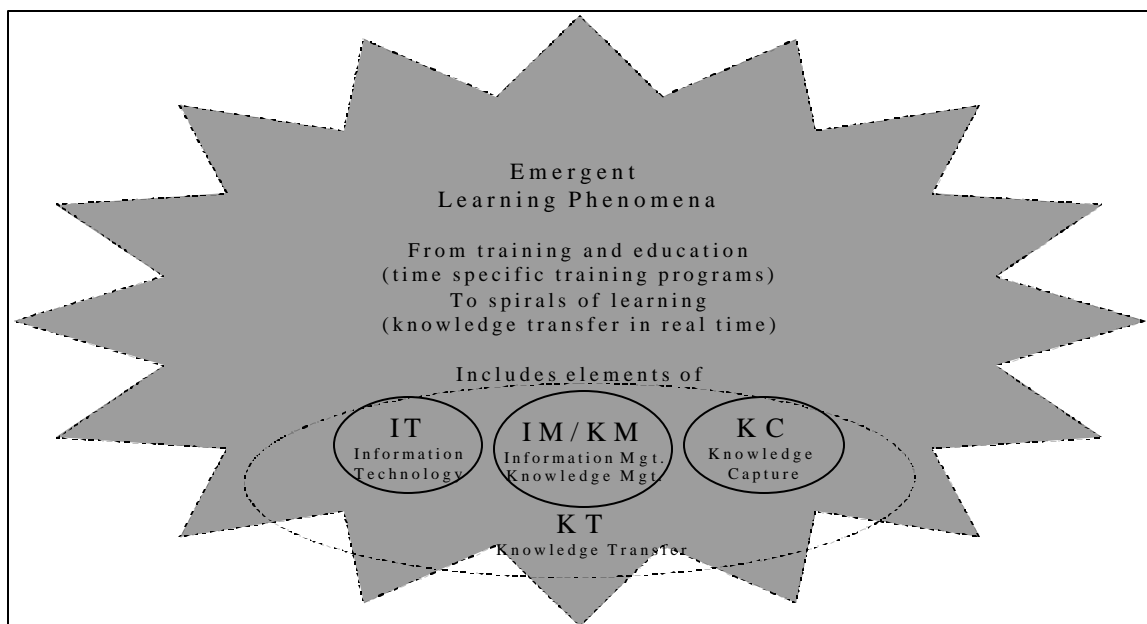components. These concepts are presented in Figures 87 and 88.

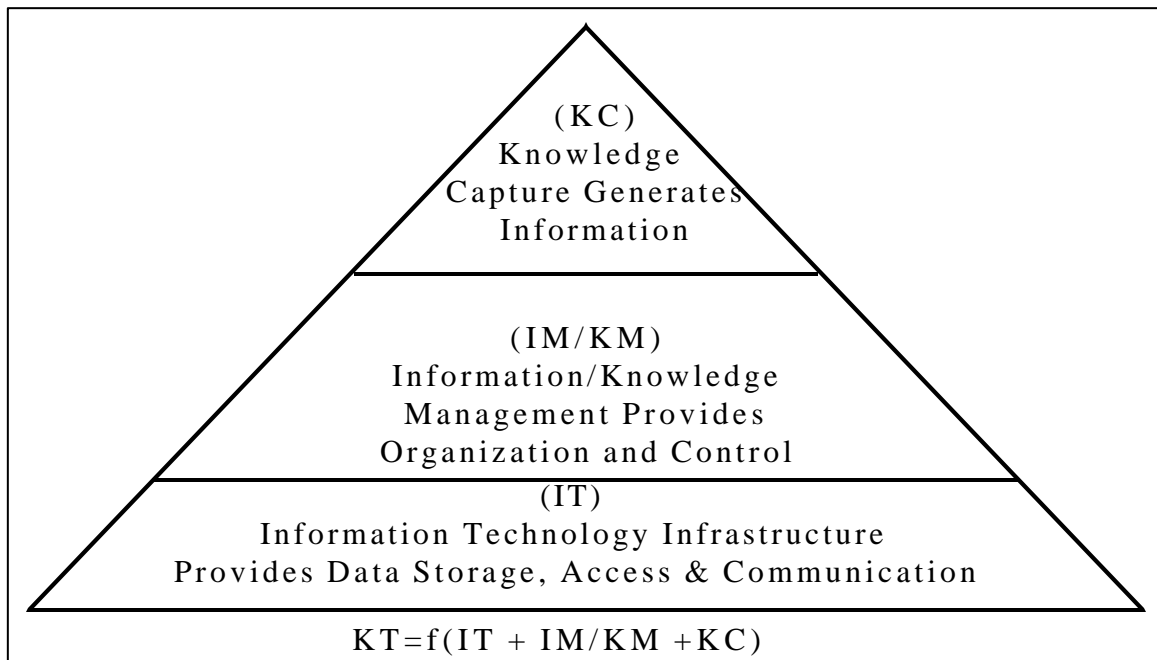Figure 87. Model of Emergent Learning Phenomena

```
                    (KC)
                 Knowledge
            Capture Generates
               Information
              ─────────────
                 (IM/KM)
         Information/Knowledge
           Management Provides
         Organization and Control
       ─────────────────────────
                   (IT)
      Information Technology Infrastructure
    Provides Data Storage, Access & Communication

          KT=f(IT + IM/KM +KC)
```

Figure 88. Hierarchy of Knowledge Transfer Components

Composite Process Model of KM Influences

With the idea that knowledge transfer is a higher-order concept (than KM),

encompassing information technology, information/knowledge management, and

knowledge capture, it must be recognized that, in order to deal with the emergent learning

phenomena and become learning organizations, organizations must ultimately seek

knowledge transfer capabilities (not just knowledge management capabilities). It has

been observed that organizations have a good grasp of the IT and IM "pieces" of the

emergent learning phenomena, but the waters are very muddied when it comes to

delineations between KM, KC, and KT. The many interpretations of the

differences/similarities between information and knowledge only add to the confusion.

Current knowledge management definitions, as offered by many, hint at elements of IT,

IM, KC, and KT, but are satisfied to leave them "all lumped together." Recognition that

knowledge "management" is just that, and that individual tacit knowledge capture, management, and transfer should be the ultimate goal of any organization struggling to become a learning organization is critical to a clearer understanding of what military organizations (and others) are currently facing.

With this explanation as a foundation, the composite process model of KM influences (Figure 89) attempts to both sort out and coalesce the findings of this research. Although simplistic in nature, it captures the process of how key negative influences conspire to erect barriers to, what the researcher now calls, KT in the military. The model attempts to describe what the researcher has observed in the process of the research. The term KM is still used in this model, however, because it is the goal of today's military operations.

Following the model, it is first apparent that there are many forward thinkers and thought leaders across the military who recognize the emergent learning phenomena and grasp that it offers something to help their organizations solve their learning problems. While these thought leaders attempt to convince leadership of the impact of the emergent learning phenomena and the benefits of what they hear called knowledge management, they struggle to adequately describe or communicate the concepts and benefits. Lack of clear understanding makes it difficult to generate leadership support. When leaders feel the thought leader is onto something, they often provide some initial support. Without adequate or sustainable resources, however, a dangerous cycle begins that most often ends with users and leaders becoming disenchanted because proposed KM systems/processes fail to generate anything of value. Ultimately, a vicious circle is

created that cannot be broken without strong leadership support, fortuitous successes that build strong leadership support, or crises that call for immediate knowledge-based solutions. Without leadership support throughout the military hierarchy, resources will not be sustained, existing KM systems and projects will not be adequately completed, and funded KM applications will not generate their promised value to users or leaders.
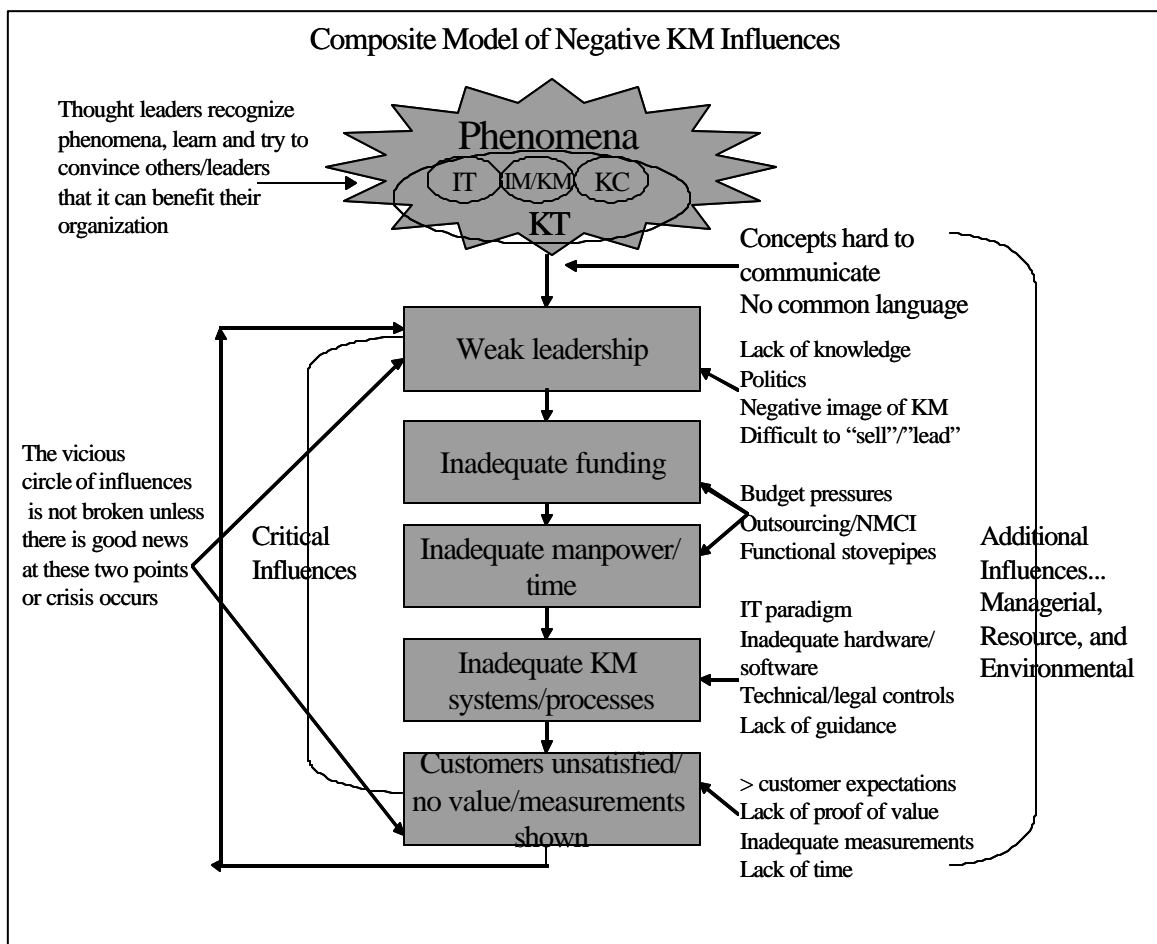

Figure 89. Composite Model of Negative KM Influences

Implications for Practitioners and Academic Research

Given the above findings, this research has implications for military practitioners and academic researchers alike.

Implications for Military Practitioners

This research suggests numerous negative influences that act as barriers to implementing KT, a broader concept than KM, in the U.S. military. When viewed from a process perspective, some influences appear more critical than others. For KT to succeed in the military, it is important for military practitioners to understand that the vicious circle presented in the above composite model of negative influences must be turned into a into a virtuous circle by taking action to counter key negative influences. Such actions include:

1)   Conducting extensive programs of leadership education

Key leaders, before anyone else, must be educated about the integration of IM, KM, and KC in the KT concepts. Leadership must understand each of these concepts and how each relates to the development of learning organizations, and their operational necessity if KT is to survive and organizations are to institutionalize learning.

2)   Establishing offices/organizations committed to KT proponency.

Although the development of a stovepipe to support KT efforts is contrary to a learning organization philosophy, it appears necessary for KT survival within the existing military environment. Such offices should not only be vested with the power to lead enterprise

KT efforts, but also with the necessary resources to establish functioning (IT-oriented) KT projects that can provide standard, leading-edge solutions for KT needs across the services. Such offices must also lead the essential people-oriented KT and culture change efforts. While the Army and Navy have pseudo-proponent offices within the existing CIO/IT organizations, there remains confusion about overlapping responsibilities and authorities of KM, CIO, and IT offices. Inconsistencies in policies and lack of coordination and resources only reinforce the current vicious circles. The ultimate goal should be to establish KT programs that become diffused across the fabric of everyday business to the point that specialized organizations can be dissolved.

3) Developing standard enterprise approaches to KT. This should include strong guidelines for KT implementation in organizations as well as standards for the development of KT applications.

With or without offices for KT proponency, the combined services/DoD must work to develop enterprise KT strategies to address the core components of IT, KM, and KC; and to provide necessary operational guidance for grass-roots efforts. In this respect, grass-roots efforts can flourish but within a coordinated and cohesive context that supports central goals.

4) Understanding/delineating the role of IT and the IT organization to support KT goals.

The unintended impact of NMCI on Navy and Marine Corps KM efforts is a prime example of how an IT-plan has adversely impacted the resources used for KT efforts. While IT is, without question, integral to KT efforts, it remains only one component of

the requirements for developing learning organizations. The relationship between KT

and IT initiatives, organizations, and funding must be sorted out, with appropriate

resources allocated to KC and KM developments.

5)   Conducting education throughout the ranks. This requires a clear description of

the roles of IT, KM, and KC in developing and implementing successful KT programs.

In addition to educating the military leadership, efforts to educate rank and file service

members must also be put in place. This will not only promote a ground swell of KT

initiatives, but it will also provide the necessary foundation for building an appropriate

language and conceptual framework that accurately communicates and operationalizes

KT concepts.

6)   Providing practical applications of KT. Demonstration centers are needed to

focus resources and efforts.

Until customers and leaders are more educated about KT, and until a descriptive language

evolves that adequately communicates KT and its underlying concepts, organizations

must concentrate on practical KT applications. Whether the KT applications are IT or

people-centric, the essential proof is, "Does it help customers and leaders do their job

better or make a decision easier?"

Implications for Academic Researchers

        This research has provided a unique look at the barriers to implementing what is

described as KM in the U.S. military. In doing so, it has confirmed existing theory about

the nature and existence of such influences as discussed in existing literature. It has also

extended the literature by providing influence models that describe how these influences

impact the process of implementing KM initiatives in the military. Finally, it has

provided a higher order conceptual view of KM, proposing that it is a simply an element

of a bigger concept called KT, which is a necessity for any true learning organization.

The recommendations for future research (both in and outside the military) include:

1)   Investigation of additional military organizations attempting to implement KT in

    order to solidify and confirm the general influence findings and process models.

2)   Investigation of the impact (during and after) of NMCI implementation on Navy

    and Marine Corps KT efforts.

3)   Investigation of both military and private sector organizations that have broken

    the vicious circle of negative influences and how they have done so. This would assist

    in expanding the recommendations about how to neutralize key negative influences,

    and would also provide great practical insight for practitioners struggling to facilitate

    KT in their own organizations.

4)   Research that identifies operational methods and approaches to KT

    metrics/measurement, cultural transition, and education.

<div align="center">Study Limitations</div>

In concluding the discussion of this research, the researcher hopes to make

readers cognizant of potential issues associated with the methodology as well as the

findings and discussion.

The first recognized limitation of the study involves the fact that a total of only

six cases were investigated—two for each service. It is recognized that the findings might

have been more robust, and possibly different, if more or different cases had been investigated.

The second limitation involves the interpretive skills and knowledge level of the researcher. The case study methodology used in this research required a high-level of integrative skills on the part of the researcher. It is possible, in coalescing the various forms of data, especially the transcripts and field notes, that the researcher may have incorrectly interpreted the responses or the relationship of those responses. In order to reduce the possibility of this occurrence, all case results were reviewed and approved by key individuals at each research site. The discussion chapter, however, represents the researcher's own views, and possibly biases. Additionally, given that this research addresses KM across all of the military services, it is very possible that there are pertinent events and changes occurring with respect to KM programs and policies at varying levels to which the researcher remains unaware.

Another limitation of the research involves the lack of clarity of the concepts that underlie the conceptual model (Holsapple and Joshi, 2000, 2002) on which the research was based. Although the influences model provided an excellent framework for guiding the research, the overlapping and confoundingr nature of the specific influences identified made it very had for the researcher to assign influences to particular categories. Any reader will notice that many of the identified influences could have easily been assigned to more than one influence category. The impact of such phenomena is that no single model can accurately describe the entire KM influence process.

Another limitation that must be mentioned is that the influence summary charts, for the most part, only represent major trends across the cases. Additionally, just because a case was not marked as identifying the negative influence (or barrier) does not mean that the organization has not or is not experiencing the influence—it simply was not mention by the respondents interviewed.

Summary

The focus of this research was to investigate the influences that act as barriers to knowledge management across the U.S. military. The specific purpose of the research questions was to identify the influences, assess whether they were unique to the military, and to ultimately assess how the influences combine to influence the process of implementing KM in military organizations. Through the use of a case study methodology, six military organizations with active KM programs were investigated. A plethora of influences that act as barriers were identified with some being considered unique to the military services. In considering how these influences act as barriers to the process of implementing KM in military organizations, it was uncovered that certain key influences must be mitigated and issues addressed if KM efforts are to flourish. Despite the outstanding efforts and uncounted positive accomplishments of KM staffs and key leaders, influence barriers include: leadership education and commitment, functional stovepipe approaches to funding and problem-solving, lack of resources, especially funding, unintended impacts of service level IT-plans such as NMCI, and the inability to show/prove value to customers and leaders. In addressing these barriers, service leaders, KM staffs and service members must also come to understand that learning organizations

require KT which includes information technology, information management, and knowledge capture capabilities and programs. Knowledge transfer should be recognized as the higher order goal which requires higher levels of leadership to integrate the requirements and provide resources to ensure their success. Finally, recognition of the vicious circle of negative influences can be a positive first step to creating a virtuous circle that allows the services to achieve knowledge transfer in support of their stated goals of knowledge superiority and the transformation to learning organizations. Overall, action must be taken at the service and DoD levels to ensure the existence of a proper enabling environment that promotes knowledge transfer at every level.

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